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Rock Products

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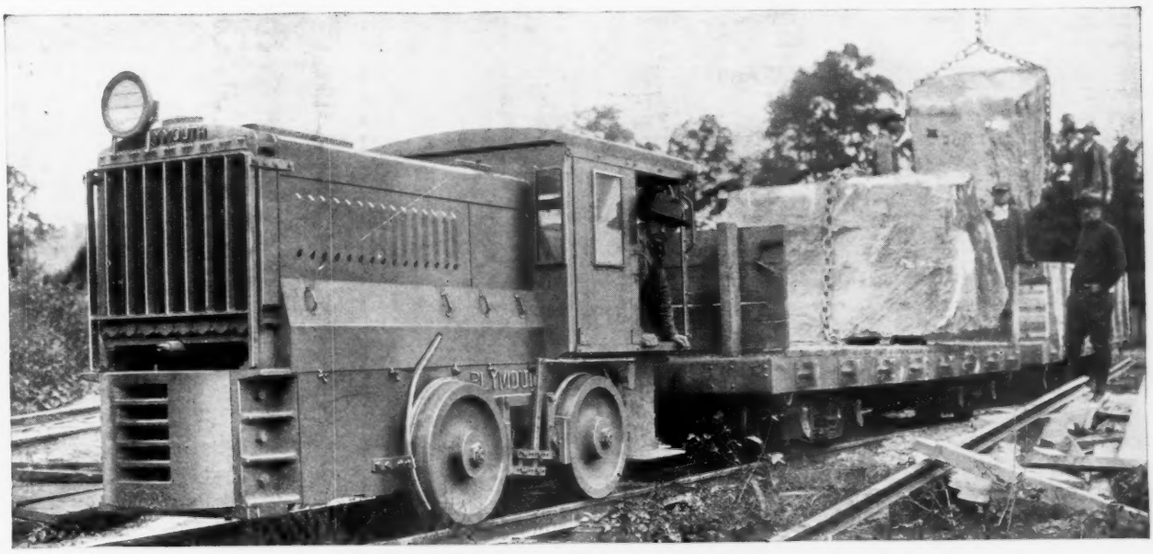

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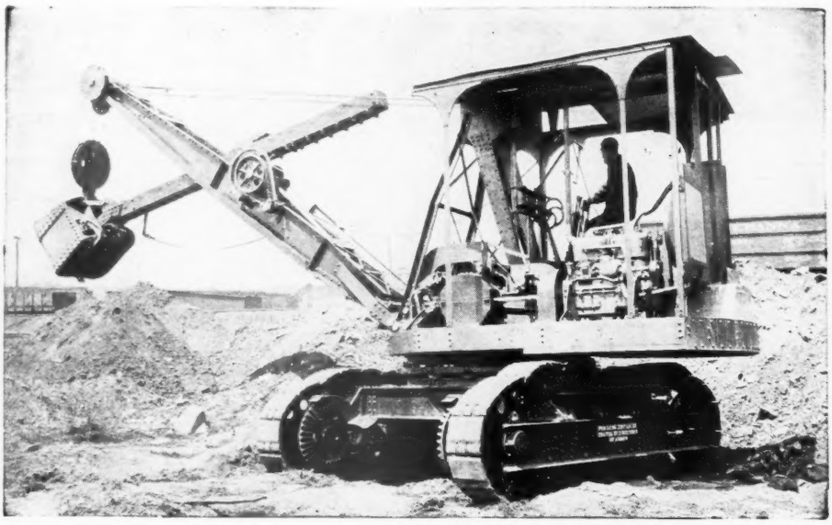

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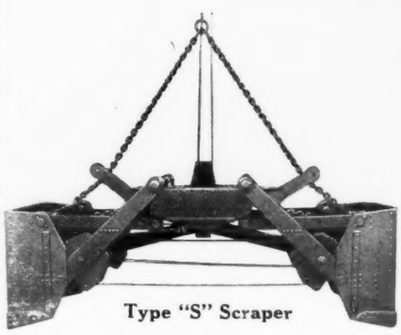


Type "S" Scraper

Rock Products

Volume XVII | Chicago, June 28, 1924 | Number 13

Growth of a Gravel Business Typical of the Modern Industrial South

Roquemore Gravel Company Erects 8000-Ton Plant, Its Third Since It Began Business in 1920

By Edmund Shaw
Editor, Rock Products

IN 1920 the Roquemore Gravel Co. of Montgomery, Ala., began operations with a dredge and a small screening plant with gravity screens. By 1922 the business had grown to where the dredge could not supply more than half the demand and a dragline with a 3½-yd. bucket was installed. A modern washing plant was designed and built and when this was erected both plants together turned out 5000 tons a day if they were pushed. The new plant had a capacity of 2500 to 3000 tons. But even still it is a question whether or not the plant will be able to meet the peak load of the season's demand. For this reason the dredge and gravity screen plant, which was the original equipment, is kept ready and waiting so that it can be put in service any time that the demand cannot be satisfied by the new plant.

Eight thousand tons is a large tonnage, even for these days of large operations. The water to wash it would supply all the needs of a city of 50,000 people. To move it requires 160 freight cars gravel away as fast as it is produced. And if the plant should cease shipping its production for a month the output would have to be piled 25 ft. high over nearly 3½ acres.

The writer visited the plant in April, a few days before it began production. After looking it over with a good deal of interest there were three questions came to his mind. The first was, how was it possible to dig 8000 tons of material a day with a dragline which has only a 3½-yd. bucket. The next was, how was it

The three plants that show how the business grew. Left—the original plant built in 1920; center—the first modern plant built in 1922, and (right) the new 8000-ton plant just put in service

this tonnage was not sufficient to supply the rapidly growing market of the Southeast and a third plant was built which has just been put into production. It has a capacity of 8000 tons a day and of 100,000 lbs. capacity, and many a fair-sized town does not handle that many cars through its railroad yards. A car has to be loaded every four minutes—rather less in fact—to take the sand and possible to put this 8000 tons through two 60-in. screens, even though they were 14½ ft. long. Many a gravel plant of less than half the tonnage has as much screen area. And finally, and the most important

The original dredge which is still kept in service as a "standby"

question of all, where was this enormous tonnage to be disposed of. Montgomery is a town of 60,000 people, Birmingham and Atlanta the two principal markets outside of Montgomery, are towns having populations of 200,000 and 350,000, as estimated. Birmingham slag is sold in this territory to the amount of 6000 tons a day and there are three other large gravel plants operating within a mile or two of the Roquemore plant, besides smaller ones. Under those circumstances how was it possible for an 8000-ton plant to dispose of its product.

J. D. Roquemore, president of the company, had an answer for each question that showed he had carefully thought out his plans and had considered every difficulty in the way before beginning to build his plant.

The digging problem had been solved by using a shorter boom on the Class 24 Bucyrus dragline, so that it could handle a 6-yd. bucket. The cars are 6-yd. Westerns, so that a bucket fills a car at each sweep of the boom. The drag line fitted with the 3½-yd. bucket has loaded at the rate of 12 tons a minute, which means a swing every 26 seconds. With the shorter boom and larger bucket the digging of the required tonnage would seem to be possible.

As to screen area, every practical man knows that the required screen area varies with the *character* of the material handled rather than the tonnage. The more "difficult" grains (those near the size of the opening) the harder the material is to screen. The Montgomery gravel is easy to screen into the required sizes because those difficult grains are not in abundance and hence the screen area is sufficient. The old plant gave ample opportunity to prove such things as screen requirements before the new plant was built.

And as to the market, one who has not seen it cannot understand the growth and enterprise of the Southeastern states

The 2500-ton plant which was erected in 1922

at this time. New industries and new highways call for abundant material to build roads, bridges, buildings and dams for water power. It so happened that while the writer was at the plant a 40,000 ton order was received, which is nearly half of a year's production for an ordinary small plant, but it did not excite anyone at this plant. One has only to consider the new cement plants in the South and the big additions to the old ones to understand that somebody must produce a lot of aggregate if this cement is to be made into concrete.

The Montgomery plants ship sand and gravel over five states—Alabama, Georgia, Florida, Mississippi and Louisiana. All over these states new enterprises are springing up and new highways are being built. The demand for gravel is not only insistant but it is constantly increasing, and unless some serious setback occurs the big sand and gravel plants of the Montgomery district will have no difficulty in disposing of their outputs.

The Roquemore plant is exceptionally well situated for shipping by rail. It has its own belt line which connects with the seven main line roads that run into Montgomery. This gives it quick action on deliveries. It is not uncommon for a telephone order from Atlanta to be received at noon one day and the material delivered in Atlanta on the morning of the day following.

One point that will strike the sand and gravel operator who looks at this plant is the small size of the bins. They are just sufficient to allow cars to be shifted and like work without having any storage capacity. Experience with the old plant was that the material could be loaded and shipped as fast as it could be made.

Mr. Roquemore has had a lot of experience in the gravel business, not only the kind a man gets in the office but the kind he gets on the job. He can run a steam shovel or look after the plant just as efficiently as he can direct the policy of his great enterprise.

Plant of the Roquemore Gravel Company

By Frank M. Welch
Chief Engineer, Greenville Gravel Co., Greenville, Ohio

WHAT is a gravel man's idea of Heaven? I would describe it as follows:

A sand and gravel deposit, consisting of about 1200 acres, fifty to sixty feet deep, containing nothing that requires crushing, located adjacent to the corporation limits of a large city, in a territory where competition is rather limited for a radius of hundreds of miles, and with a belt line running through the tract which connects seven railroads.

Locomotives are kept busy at a plant where a car is loaded every four minutes or less

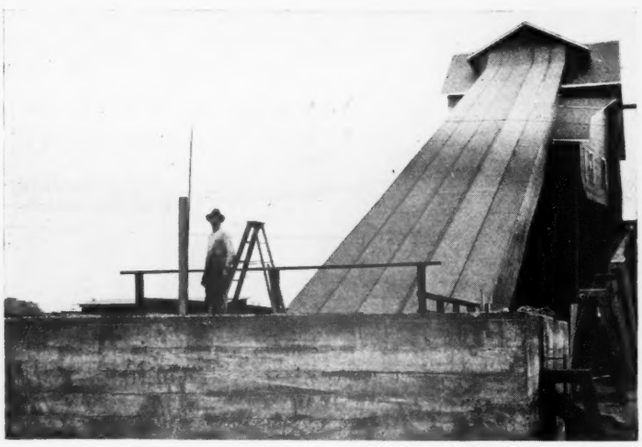
The above describes the property of the Roquemore Gravel Co. of Montgomery, Alabama, and I haven't told the half of it. The 1200 acres, which is 1246 to be exact, is as level as a dance floor throughout. Besides the belt line, the main line of the L. & N. Railroad, runs through the middle of it. The transfer yards of the belt line are also adjacent to the Roquemore deposit, which makes car service ideal and car shortage unknown. Roquemore locomotives handle all the switching. The desired cars are selected in the transfer yards and brought to the plant. The loaded cars are returned and spotted on the proper train track in the yards which facilitates their early departure on one of the various railroads and into one of the five states where this plant ships sand and gravel.

Previous to 1922 the Roquemore Gravel Co. operated a small pumping unit in conjunction with some gravity screens, but soon found that the demand for material exceeded the capacity of their limited equipment. In that year they purchased a 3½-yd. drag line outfit for excavating and installed a modern washing and screening plant. The new plant had a capacity of 45 cars per day, but the market for sand and gravel exceeded the output of the new plant before it was six months old. Therefore, a new and still larger plant has now been completed which, in consideration of its capacity and efficiency is probably the premier gravel plant of 1924.

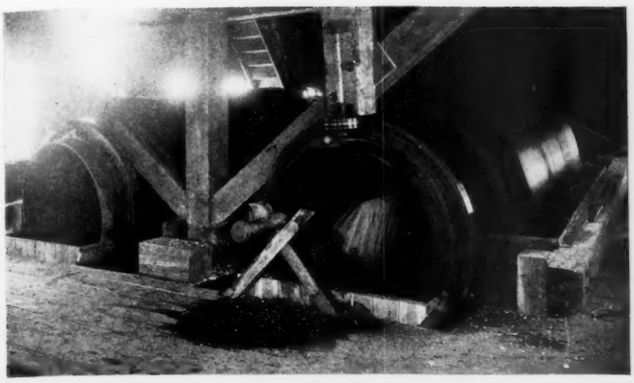
Owing to the continuation of business in the southlands during the winter months, the company could not afford to stop the old plant long enough to build a new one. Therefore, the new plant was built a few hundred feet away from the 1922 model, and the question now uppermost is whether 160 cars per

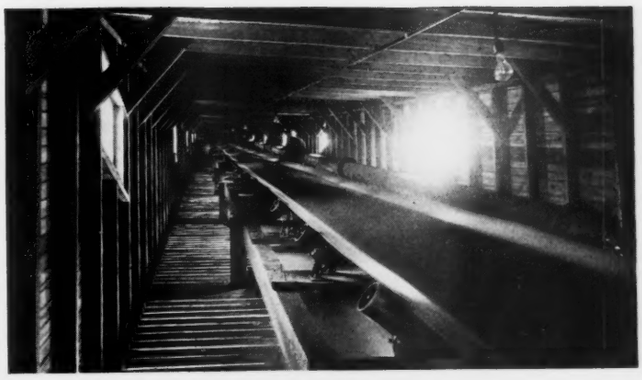
Since this picture was taken the dragline boom has been cut off 15 ft. and a 6-yd. bucket installed in place of the 3½-yd. bucket shown

Side elevation of plant showing bins and sand settling tanks

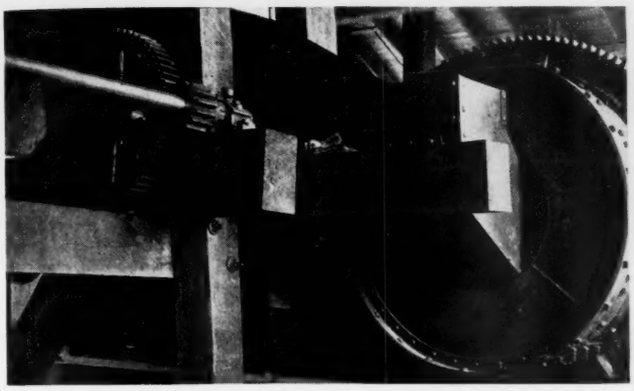


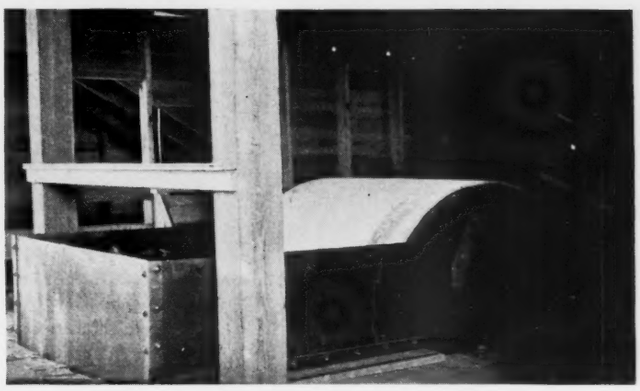
Left—Concrete hopper, taken during construction. (The pit cars pass over this.) Right—Detail of bins and sand settler. The sand settler (in the center) has hand-operated gates



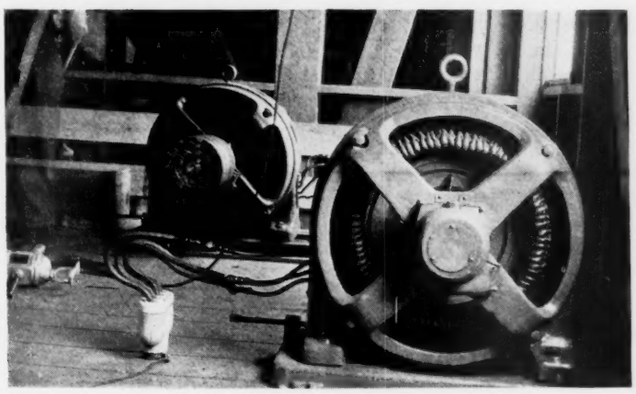


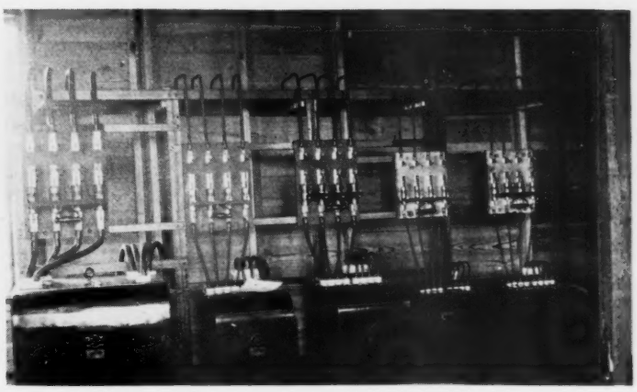
Left—Gravel screens showing washing sprays. Right—The 48-in. belt conveyor



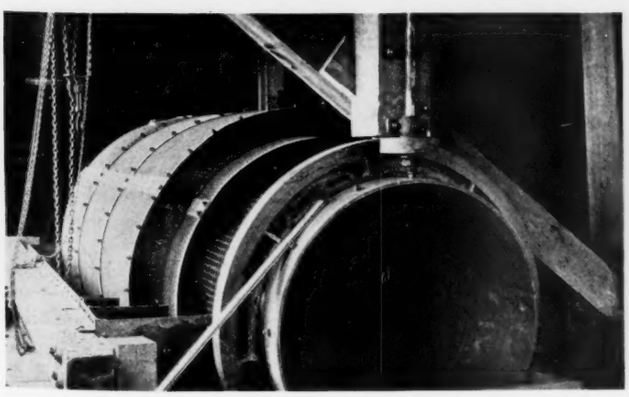


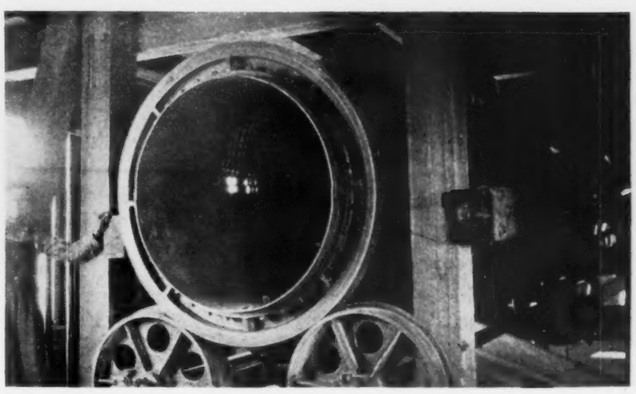
Left—Drive end of gravel screens. Right—Head of 48-in. conveyor





Left—Special electric motors with extra heavy bearings and shaft. Right—Switch board

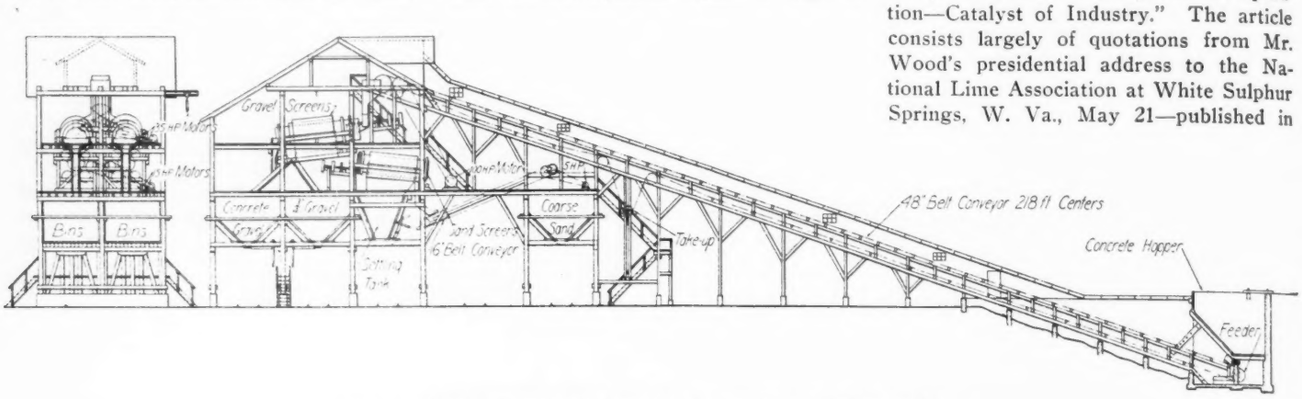




Left—Triple jacketed gravel screen. Right—Sand screen. (Note inner jacket with 2-in. holes)

day, which the new plant produces, will be adequate or whether the market will demand the continuous operation of both plants.

The new plant is similar in many ways to the plant built in 1922, except that it is over three times as large. An 18x25 ft. concrete hopper receives raw sand and gravel from trains of pit cars. An automatic rotary feeder, uniformly controls the flow of material on to a 48-in. belt conveyor with Goodyear belt, from the receiving hopper. The conveyor discharges at the top of the plant into two 60 in. by 21 ft. triple jacketed revolving screens. A large butterfly valve in the steel discharge spout from the conveyor divides the material in any proportions desired between the two big screens, or throws it all into one screen if desired.



Side and end elevations showing the position of the machinery

The feed end of these screens is equipped with scrubbers, 60-in. diameter by 6-ft. 6-in. long, which thoroughly wash the product. Spray pipes of fresh water rinse and re-wash the material while it passes through the screens and after the original dirt laden wash water has passed on. A butterfly valve under each screen permits absolute regulation of the percentage of fines in the concrete gravel.

Three grades of gravel are produced at one time which, apparently, is all the market demands. However, the company is equipped to furnish any grade of its product desired. The three grades fall into separate bins, each of which holds four to five carloads. The bins are about 30 ft. long and equipped with four gates each which permit a car to be completely loaded without shifting.

All the sand, together with the washing water, passes through the outer jackets of the main screens and is flumed to two 60-in. by 12-ft. sand screens, where the fine sand is separated from the coarse. These screens have an inner jacket with 2-in. holes to spread the feed and protect the screens. Large settling tanks underneath these screens separate the dirt-laden water from the fine sand. These tanks also extend the 30-ft. width of the plant and being equipped with five sand valves, a car of sand can be loaded without shifting. The coarse sand is conducted by a 16-in. belt conveyor to a separate bin where it is loaded out for road dressing and other purposes.

Butterfly valves are installed in the flumes between the main and sand screens, which permit the positive regulation of coarseness of the fine sand, by allowing any portion of the original sand to pass directly to the settling tanks. By the use of the various butterfly valves throughout the plant, a flexibility of product is accomplished equal to that of many plants more lavishly equipped.

The plant is electrically driven, each unit being operated from a separate motor. The motors were furnished by the James Clark Jr. Electric Co., Louisville, Ky. All the mechanical equipment including screens, conveyors, feeder, transmission machinery and gates, were furnished by the Greenville Manufacturing Co., Greenville, Ohio.

The plant was engineered and designed by the Consulting Engineering Department of the Greenville Gravel Co., Greenville, Ohio, who were also the designers of the plant built in 1922.

Rock Products Men to the Fore

THE *American Magazine* for June contains a very complimentary article on the rock products industry's good friend and co-worker, "Sam" R. Russell, technical representative of E. I. du Pont de Nemours & Co., Wilmington, Del. A characteristic picture of "Sam" is shown and the article —"Wonders That Are Done With Dynamite"—consists wholly of quotations from an interview with Mr. Russell. He is credited with having shot more than 2,000,000 lbs. of explosive with his own hands—more than any other man in the world, in all probability.

Otho M. Graves, of the General Crushed Stone Co., Easton, Penn., first vice-president of the National Crushed Stone Association, is quoted at length by William N. Vaile, member of the committee on immigration and naturalization, United States House of Representatives, in an article in the May 17 issue of *Collier's Weekly*. Under the caption, "Lure of the White Collar," Mr. Graves' testimony before Senate immigration committee on behalf of the crushed-stone quarry industry is given especial prominence. The title of the article is "Who Will Do the Dirty Work?" meaning the heavy physical work of producing and constructing—not politics.

George B. Wood, president of the National Lime Association, has a page in *Chemical and Metallurgical Engineering* for June 2, under the caption "Co-operation—Catalyst of Industry." The article consists largely of quotations from Mr. Wood's presidential address to the National Lime Association at White Sulphur Springs, W. Va., May 21—published in full in ROCK PRODUCTS of May 31. The concluding paragraph reads:

"George B. Wood, president of the Rockland & Rockport Lime Co. and president of the National Lime Association, is one of the leaders of his industry, and his foresight and influence have been great in gaining the hearty co-operation of his fellow manufacturers. His address at the recent convention of the association should stir his whole industry to an enthusiastic indorsement of his policy."

File on California Gypsum Claims

DEVELOPMENT of extensive salt and gypsum beds on the desert was forecast when claims on nearly 14,000 acres at Cadiz Lake, a dry lake, 120 miles east of San Bernardino, Calif., were filed.

The claims, signed by Victor L. Smith, Nora K., J. J., Grace M. and R. R. Smith, Florence and Nellie E. Sargeant and A. L. Washburne, were recorded and cover acreage almost directly in the center of the dry lake

Although the claimants did not reveal their plans for development of their holdings, it is known that the lands on which the claims were filed contain extensive salt and gypsum deposits. The property is 12 miles south of the Cadiz station and near Mulligan on the Santa Fe's Parker cut-off line into Blythe.

The claims are the first to be filed on property in the district.—*San Bernardino (Calif.) Sun.*

Lime and Gypsum Dust Prevent and Cure Tuberculosis

Long Island Physician Makes Use of Gypsum Dust with Much Success—But Finds Prejudice Among Medical Men

POSSIBLY readers will recall our article in ROCK PRODUCTS, January 14, 1922, on "Lime and Tuberculosis," summarizing results of a questionnaire on this subject sent to American lime manufacturers. Recently, through George A. Olson, of the Gypsum Industries, Inc., Chicago, the editor was put in touch with F. Tweddell, M.D., Great Neck, Long Island, N. Y., who has given this subject much study.

In a paper read before the Section of Medicine, New York Academy of Medicine, May 15, 1923, Dr. Tweddell made the following statements:

It seems strange that no practical use has been made of a condition first noticed by a French physician, Renon, in 1906, and a little later, in 1909, by a Spanish physician, Fisac, viz., that all men employed in lime or plaster of paris works were immune to tuberculosis. Thousands of men are employed in this industry, year in and year out, and as yet no cases of tuberculosis have been reported among them. Is it not then reasonable to suppose that this immunity is brought about by the inhalations of the dust of lime and plaster of paris in these factories? It is inconceivable that it could be due to any other cause, for the calcium dust is the common factor in all the localities where this immunity has been observed. It is but a step further to conclude that calcium is a specific in tuberculosis, and as we have lamentably few specifics in medicine, it should be our aim to add to them.

I pointed out in a former paper (1), that pulmonary tuberculosis, bearing in mind the anatomy of the lungs, can be treated only in two ways, namely, by inhalations or by intravenous injections, whereby the medication will reach every part of the lungs. By inhalations the fine particles of calcium oxide or calcium sulphate penetrate to the remotest parts and there set up an alkaline antiseptic reaction with the moist tissues, which tends to overcome the acidosis nearly always present. The constant associated deficiency of calcium is thus also corrected. It would be difficult to imagine a more ideal method of administering treatment.

Every conceivable remedy has been tried in pulmonary tuberculosis without any logical reason. Here, however, we know that all men who inhale lime or gypsum are free from tuberculosis, and it is only fair to the many sufferers from this disease that we should give it a trial. I apologize for the small number of cases I am about to report, but I can not get facilities for trying out this treatment on a large scale at some hospital. I am sure I have tried.

[Here follow specific reports of a number of cases.]

There has always been a great objection to deep breathing in tuberculosis. I could never see any reason for this, for it is better to get good air into every part of the lungs than to leave part of them with stagnant air. The tubercle bacilli find a suitable breeding ground at the apex owing to the stagnant air, but seldom at the base, which is well aired. When you use sulphur dioxide or calcium sulphate inhalations, as I have, you will notice that signs of tuberculosis disappear first at the base, and much later at the apex, which demonstrates conclusively that the base of the lung is better aerated than the apex. Investigators have recently shown that deep breathing in tuberculosis is beneficial. Otabe (3) has demonstrated that deep breathing has a retarding influence on the tuberculosis process.

Leuchtenberger (4) describes the action of calcium as follows: "On the heart it resembles digitalis, it assists in the coagulation of the blood, it diminishes nervous and muscular irritability, it increases the phagocytic action of the leucocytes, it is also anti-inflammatory and anti-exudative." Decalcification exists in all diseases and conditions in which nutrition is at a low ebb. Lack of calcium means that metabolism is at fault, consequently, food is not being digested and assimilated as it should be, and accounts for loss of appetite in tuberculosis. Given a certain pathological condition of the lungs and having applied thereto a certain chemical reagent, the resultant chemical reaction should invariably be the same, with the exception of idiosyncrasy in a very small percentage of cases.

Bovine tuberculosis also appears to be due to deficiency of calcium. The Ohio Agricultural Experiment Station published reports (5) showing that *without exception* there was loss of calcium in every milch cow, varying from about 2 to 18 grams a day. In a group of six cows, the average loss was over 14 grams a day. It was shown that the cows for some unknown reason were all obliged to draw upon their skeletons in the production of milk. The fact that a milking cow loses calcium at the same time she receives a supply greatly in excess of the amount utilized, shows that the bones are more readily accessible for use in milk production than the calcium of the ration. And I might add that the administration of calcium by mouth to tuberculous patients is equally ineffectual, and like cows, human beings draw upon their bones for the supply of calcium. Milch cows often have disease of the bones as a result of this loss, and tuberculous patients often show decalcification of the bones as proven by radiographic plates.

Coutiere (6) more than a year ago used inhalations. The atmosphere was heated by electricity, saturated with lime and mixed with carbon dioxide in varying proportions. The inhaler was used for five minutes ten to twelve times a day. Signs of disease rapidly subsided, while the strength of the patients increased. Fluoroscopic signs of calcification also became apparent. The same treatment was tried independently by another physician, who reported 40% of apparent cures.

This treatment by calcium inhalations is so cheap, so simple and so harmless, and, in my opinion, so efficacious, that I hope no one who is interested will hesitate to give it a trial. As we know, the germs of tuberculosis obtain entrance into the body usually through the lungs, and it is surely not unreasonable to introduce the remedy, which will kill the germs or arrest their growth, through the same channel. The harmful action of destructive gases on the lungs has been widely demonstrated, and I am convinced that there is an equal opportunity for successful experimentation in the use of inhalations which will have a beneficial effect when correctly used.

Comment

Since reading this paper, I tried the commerical lime for inhalations. It should not be used for this purpose, as it is irritating, causing severe coughing, whereas the commercial plaster of paris does not irritate. I can give no reason for this.

An editorial appeared in the *Journal A. M. A.* on June 2, 1923, entitled: Calcium Therapy in Tuberculsosis, which is incorrect and misleading. The first sentence reads: "The resistance to tuberculosis of those who work in lime dust is traditional." The writer then proceeds to give a long dissertation on the uselessness of administering calcium salts by mouth, and calcium chloride subcutaneously and intravenously. In this statement he is perfectly correct, but no mention is made of the fact that workers in lime or gypsum are immune to tuberculosis, because they inhale it—they do not eat it, although they must swallow some of the dust—neither do they have subcutaneous or intravenous injections. The article ends with the emphatic statement: "Certainly there appears to be no scientific basis for their continued utilization," i.e., of calcium compounds.

The plain fact still remains unchallenged, that workers in lime and gypsum do not suffer from tuberculosis—because they inhale calcium.

Editor's Note

THE author of this article and the succeeding one is thoroughly enthused with the results obtained in such cases as have come into his practice. He finds a good deal of inertia among his brother physicians about the acceptance of both the theory and the results of his treatment. He also finds a great deal of real ignorance among physicians of facts that have long been established in such industries as the lime and gypsum plaster industry.

Further Thoughts on "Lime and Tuberculosis"

By F. Tweddell, M.D.

RECENTLY the editor of ROCK PRODUCTS read my article on "Calcium Inhalations in the Treatment of Tuberculosis," which appeared in the *New York Medical Journal and Record* of February 20, 1924, and sent me his article on "Lime and Tuberculosis" which appeared in ROCK PRODUCTS on January 14, 1922. He has very kindly asked me to make comments on his article for publication in his magazine.

The article "Lime and Tuberculosis" is a collection of reports from various lime and cement plants on the health of the workers therein. These reports are necessarily not complete enough to lead to any hard and fast conclusion, for the simple reason that, although most of the managers noted that their men were free from tuberculosis and suffered very little from coughs and colds, they gave the matter very little thought previous to the inquiry. I know from my own experience that the dust of lime (CaO) is very irritating to the throat and lungs; even a few whiffs from a powder blower cause burning in the throat and the windpipe and intense coughing. Two of my patients had a similar experience, and therefore I have not used it again. Dr. Reckzeh's experiments were similar to mine and gave the same unfavorable results with lime. It appears however, from the reports submitted, that men get used to inhaling the dust of lime after a couple of weeks' exposure to it.

Dr. Hoffman's studies refer to the health hazard in lime plants as very bad. In some places the air is dense with the dust of lime, and under these circumstances we must expect to find irritation of the skin, inflammation of the eyes, anemia and shortness of breath—and yet, there was no mention of tuberculosis.

The consensus of opinion in lime plants points to the overwhelming *fact* that the health of the workers is unusually good, that the men are practically free from tuberculosis, coughs and colds. There were five deaths mentioned and of these, one man had previously worked on granite and sandstone and thereby irretrievably injured his lungs. Three deaths were probably brought about by excessive drinking. The fifth death, mentioned in Colonel C. W. S. Cobb's report, was that of a man who is said to have contracted tuberculosis three years after his wife died of this disease, and he died fifteen months later. I cannot believe that this man contracted tuberculosis three years after his wife's death. He probably died of some other disease resembling tuberculosis. It is a well-known fact that more than 5% of the patients in santaria for tuberculosis do not die of this disease, as revealed by autopsies.

The reports come from plants which are making lime and cement. Lime contains pure calcium oxide, but cement contains only about 62% of calcium oxide and about 24 to 30% of silica, which is an insoluble product and consequently injurious to the lungs. Calcium oxide, however, can be absorbed by the lungs. Even so, W. H. George reports that the cement dust was not injurious to his men.

Investigations by Renon, the French physician, and Fisac, the Spanish physician, in lime and gypsum plants showed that men working in these plants were free from tuberculosis. In 1918 I made investigations along similar lines in this country in 22 plants manufacturing the above products and no cases of tuberculosis were reported. In fact the health of the workmen was exceptionally good.

In my practice for the treatment of pulmonary tuberculosis I have used a liquid calcium preparation for intravenous medication since 1916, which I discarded two years ago in favor of inhalations of gypsum from a powder blower, as the intravenous preparation was efficient only in the incipient stage, whereas the gypsum could be used in all stages of the disease. Inhalation of gypsum does not irritate the throat or lungs in any way.

As I am a general practitioner, no cases of tuberculosis are referred to me for treatment, so that since my last article I have had only four patients. One, a French lady who probably had had the disease for a great number of years. Every part of her lungs was affected, and she was not expected to live more than a few months. I saw her first in June, 1923, and she has shown steady improvement since. She is now up most of the day.

In November, 1923, I saw a patient who complained of a cough for six months, which nothing would relieve. She also felt tired and run down. My examination of her throat and lungs revealed no clue. She saw a throat specialist in New York, who could find nothing wrong and referred her to a tuberculosis specialist. The latter could find no reason for her cough and referred her to an X-Ray specialist.

The report of the X-Ray examination specified certain shadows in both lungs, probably due to tuberculosis.

After seeing this report I advised her to try gypsum inhalation for a week. On the third day her husband told me that his wife was feeling perfectly well and that the cough had stopped.

The third patient came to me in February, 1924. Both lungs and the larynx were affected. He had contracted tuberculosis about five years ago. After two weeks' treatment, his throat became normal as reported to me personally by the throat specialist who had been treating him. His lungs have not cleared up yet but he is improving.

The fourth patient was seen a few weeks ago. He is 36 years old and has had tuberculosis for over 15 years. His right lung is practically destroyed and his left lung is in bad shape. After two weeks' inhalations, his cough has greatly diminished and he feels very much better in every way.

There are other ailments in which calcium appears to act as a specific, namely in rheumatism and nervous breakdown. Calcium treatment is applicable only to the type of rheumatism caused by exposure to cold and dampness. It is of no use in cases caused by infection of teeth, sinus, chronic appendicitis, etc. I calculated that in those cases brought on by cold and dampness, the blood, tissues and secretions were less alkaline than normal and that by increasing the alkalinity the symtoms would disappear, and I was justified in my conclusions by the results I obtained in the three cases that I treated.

In May, 1919, a young man about 22 years old was about to start for Arizona because of chronic rheumatism contracted during the period of the war when he served in the Navy. He had seen several specialists in New York, but did not improve. He showed no focus of infection anywhere. Nearly all his joints were painful but not swollen. His symptoms were worse in the morning, and he could not go to business. The day following the first intravenous injection he was entirely free from symptoms, he was up at 8 a.m. which he had not done for months. After the seventh injection he was entirely cured.

The other two cases were acute. In both, the joints at the shoulders, elbows, knees and ankles were greatly swollen and very tender and painful. The patients were unable to walk. I had difficulty in straightening the elbow to enable me to give the intravenous injections. Twenty-four hours after the first injection they were walking around and complained only of soreness of the joints. At the end of a week after three injections both seemed perfectly well.

In regard to nervous breakdowns, my first case was an automobile agent in New York who failed in business. His wife told me he was very nervous and irritable, did not sleep well, had lost his appetite and was very much upset generally. I had an idea that excessive worry and mental depression would lead to an acidosis, which might be corrected by making the blood more alkaline. He consented to an intravenous injection which I

gave about 11 a.m. in my office. I advised him to go home and to try to sleep after lunch. He told me later that he fell asleep after lunch, woke up about 4 p.m. and felt like a different man. He was cheerful and optimistic, and did not care a rap what had happened to his business. Two days later he had another intravenous injection, and he has had no mental depression or nervous symptoms since.

A lady who had recently lost here husband and was left penniless with two children, opened a boarding house to make a living. She sent for me and I noticed she was mentally depressed and much worried. After the second intravenous injection she was very cheerful and told me she had not felt so well for many years.

Three months ago a butcher consulted me about his nervousness, loss of appetite and indigestion. I gave him a preparation of calcium which I obtain from the laboratory of a physician in Philadelphia. He was told to take a teaspoonful in water, three times a day before meals. Two weeks later he was feeling perfectly well and had gained three pounds. When he first came to me he weighed 147 pounds and now, three months later, weighs 172 pounds.

I could report several other cases like the above but the reader would be wearied by so much detail.

Summary

Calcium appears to me to be a specific in the treatment of early cases of pulmonary tuberculosis, as well as in rheumatism, brought on by exposure to cold and dampness, and in cases of nervous breakdown with mental depression and worry.

I have repeatedly asked permission to treat tuberculous cases by this method in hospitals, but so far I have been refused such service.

Tuberculosis in Cattle

A few days after forwarding the above article to the editor of Rock Products I received a letter from one of the agricultural directors in the Middle West who at my request made inquiries into the prevalence of tuberculosis among cows in Arizona, New Mexico, etc., where the soil is very rich in calcium and where at times the climate is dry and windy and consequently the air is laden with small particles of lime or gypsum and which is inhaled by the cows. It struck me that since all men working in lime or gypsum are free from tuberculosis, it is only reasonably to suppose that cows living under similar conditions would be free from tuberculosis.

Herewith an extract from the report:

Since I wrote you I have made inquiry in regard to health of stock in three localities of western United States where gypsum is an admixture of the soil. The questions I propounded and the answers are shown in the table below.

	Reply No. 1	Reply No. 2	Reply No. 3
Is land pure gypsum or admixture?	Both	Both	Pure and mixed
Does it support vegetation?	Scant	Yes	Yes; excepting where gypsum is near surface
Are cattle raised?	Yes	Yes	Cattle graze on the land
Does tuberculosis occur in stock?	None ever reported	None found in native stock	Never known in native stock
Do dust storms occur?	Frequent in spring	Bad ones in spring	Yes
Direction of storm?	Eastward	Eastward	Eastward
Health of humans?	Roswell, N. M., is T.B. resort and some remarkable cures have been secured	Very healthy	Health splendid and favorable for cure of T.B.

Some years ago the Agricultural Bureau at Washington, D. C., informed me that there was just as much tuberculosis in cows which drank hard water (i. e., containing plenty of lime) as in those which drank soft water. This information confirms my previous statement before a medical society that tuberculosis of the lungs can be cured in two ways only, viz., by inhalations or intravenous injections of calcium and that the taking of food, rich in calcium, has very little or no effect in curing the disease. On the other hand calcium has great prophylactic value, for persons whose food contains an adequate amount of calcium cannot contract the disease.

Imagine the diagnostic value of this discovery. It is stupendous. For instance, a person feels run down, has no ambition, a slight cough and after a little exertion or exercise gets out of breath and feels tired. He suspects tuberculosis, picks up a powder blower half filled with gypsum and after only 24 hours' use knows that he is getting better and at the end of a week he is himself again.

On the other hand, if there is no improvement after a few days' inhalations, he can be certain that he is not a victim of tuberculosis, but of some other disease.

Inhalation of gypsum not only makes the diagnosis but cures the patient. In the very earliest stage of the disease a patient chases from one physician to another, when the X-ray is not conclusive and when the examination of the sputum is nearly always negative. No wonder he is seized with doubt, suspicion, uncertainty.

Yet with all these facts at their disposal, the medical profession will take no action in this matter.

Experience of Gypsum Products Manufacturers

IN GENERAL the replies received from manufacturers of gypsum and gypsum products were to the effect that they had never given the subject of tuberculosis among their employes any thought whatsoever. Consequently they had very little experience to relate. This in itself is pretty good proof that tuberculosis must be rare at gypsum plants. Otherwise cases certainly would be recalled. Herewith are some typical replies:

Michael Croce, chief chemist, Certain-teed Products Corporation, Philadelphia, Penn: "We have consulted one of our plaster division superintendents, who has had the best opportunity to note any salutary effect of gypsum dust on workmen and we quote his letter verbatim:

"Not long since one of our employees left here to go to a sanatarium in Oklahoma on account of tuberculosis, but this is the only case that we have ever known of. Several years ago, a man came from a farm in this vicinity to work at this plant, and we understand that he had been examined by several physicians, all of whom told him that he was suffering from this disease. He worked here for some time in the calcining department, and at the time he left here was in apparent good health. We saw him a few months ago and he seemed to be perfectly healthy. We do not know of any other cases, but of course we have never made any attempt to prove the theory that gypsum dust would cure tuberculosis, that is we have not employed men that we knew were sick.

It is a fact that the dust around the calcining kettles is very beneficial for catarrh of the head, as we have known of a number of cases that were helped.

We have heard that there is a physician in New Jersey who administers plaster of Paris as a cure for tuberculosis, but we do not know what success he has had."

We regret that we are not able to give any more information on this subject.

Frederick S. Beard, vice-president and general manager, Crescent Wall Plaster Co., New Orleans, La.—I will say personally, that during my twenty-five years direct connection with the gypsum industry that I have never known gypsum dust in our mills, that is those mills with which I have had something to do, to cause any injury to the workmen in those mills.

I have heard at different times that men afflicted with tuberculosis have been benefited by working in gypsum mills, but no direct cases have ever come under my personal observation. The work that men have to do in plaster mills is hard work, and a man afflicted with the above men-

tioned disease would have a very hard time to do his work properly, consequently the work itself acts as a bar against men taking up this class of employment.

The writer is very sorry that he cannot give you some real examples of the thing you want to publish, but I will close this letter by saying that the dust in a gypsum mill to my certain knowledge has never harmed any workman that I know of.

R. M. Calkins, Jr., president and treasurer, Northwest Gypsum Products Co., Lewiston, Mont.—The writer happened to be present at the plant when this subject was discussed between the superintendent of this company and Mr. Shaubert, superintendent of the Hanover plaster mill. Mr. Shaubert has been in the business a long time and recalled that a Dr. H. G. Gough, formerly at Acme, Tex., and later at Nephi, Utah, with the Nephi Plaster Co., made the same claims as set forth by Dr. Tweddell in the copy which you sent us.

We discussed the matter with the doctors who have charge of our men and those of the Hanover plant, and they state that they had no knowledge of any such cures, although they had not followed the matter closely.

The writer has noticed that the men working for this company are extremely healthy and bothered by very little sickness. It is very unusual for a man to lay off on account of sickness. Colds seem to cure rapidly.

The writer recalls a request from one of the largest and finest Holstein stock farms in the United States for a quantity of crude gypsum rock to put in the wells and springs from which this farm obtained its water for the dairying herd. Their object was to obtain more lime content in the water.

The company referred to is the Carnation Milk Products Farm at Carnation, Wash. Whether this was to be used as a preventive for tuberculosis or not it is impossible for me to say. However, we know that the water in that country has very little lime and that tuberculosis is a serious matter among all dairy cattle, let alone fancy and expensive herds.

The foregoing is all that we know on the subject and had not given it any thought at all until receipt of your communication.

L. J. Holliday, vice-president, Overland Cement Plaster Co., Laramie, Wyo.—We have your favor enclosing advance proof of articles on gypsum dust with relation to tuberculosis. We have found this very interesting, but regret that we have nothing that we can add to it. At our altitude of 7200 ft. tuberculosis is not at all prevalent and at the same time the climate is too rigorous to make this a popular resort for those suffering from this disease. We have no knowledge of any cases of tuberculosis in the gypsum mills at Laramie.

W. E. Shearer, president, Universal Gypsum Co., Chicago, Ill.—We have made quite a thorough investigation of the matter of tuberculosis being prevalent or cured as the result of working in a gypsum mill. We have developed no instance of cures of tuberculosis, neither have we developed a case of the disease. Therefore it is apparent that the breathing of gypsum dust by the workmen in gypsum plants is a preventive inasmuch as the absence of the disease is unusual as compared with statistics of the disease in the average vocation in life.

W. M. Adamson, president, Arizona Gypsum Plaster Co., Douglas, Ariz.—Referring to your letter, the Arizona Gypsum Plaster Co. has been in operation for the past 20 years and during all of that period I have never known any of our employes to have contracted tuberculosis at the gypsum plant or quarry.

About 18 months ago two young men, brothers, went to work for this company. Both of them were afflicted with tuberculosis and appeared to be weak and unable to do very heavy work. They were also compelled to lay off at least a day each week for a long time. But in the last summer months they have not laid off due to their disability and both have got much stronger and are doing fine.

H. C. Ballem, president, Iona Gypsum Products Ltd., Sydney, Nova Scotia—We have taken the matter up with our plant superintendent and it appears that we have not very much information to supply. There has not been any of our employes on the sick list since we started operations and this in itself should be sufficient proof that gypsum manufacture is a healthful occupation.

M. A. Reeb, president, Niagara Gypsum Co., Buffalo, N. Y.—We have had the matter in question up with our superintendent at the plant who informs us that as far as his knowledge or experience is concerned, we have had nothing of this nature at our plant.

C. Henry Dimock, president, Windsor Plaster Co., Ltd., Windsor, Nova Scotia.—We are pleased to reply that we have no record of any of our workmen having had or now have this disease.

William Martin, president, Manitoba Gypsum Co., Ltd., Winnipeg, Manitoba.—So far as tuberculosis among our employes goes, this company has been operating a mill at Winnipeg since 1904, and we have yet to hear of any of our employes being affected with tuberculosis. It is probable that the freedom from this disease may be owing to the sanitary condition of the work.

Dr. Frank A. Wilder, president, Southern Gypsum Co., North Holston, Va.—Our mill has been in operation for 18 years. During this entire time, although no special effort has been made to prevent the employment of tubercular men in the mill, and no physical examination of mill men has been made to see that they did not have tuberculosis when entering employment in the mill, I find that we have never had a case of tuberculosis in connection with any of our mill employes. Moreover in one or two cases where tuberculosis was suspected in mill employes the condition of these men has improved until now they are not regarded as tubercular suspects.

J. Clifford Woodhull, vice-president, Rock Plaster Corporation, New York City.—W. P. Holland, our superintendent, has been associated with this concern for 35 years, during the greater part of which period his time was spent within the factory where he was continually subjected to gypsum dust.

Mr. Holland is today in rugged health and has never had any lung trouble.

From his personal knowledge during this period of 35 years, none of the operatives of the mill ever gave any evidence of tuberculosis.

D. A. Diniton, The Best Brothers Keene's Cement Co., Medicine Lodge, Kan.—Answering your letter, regarding gypsum dust as a preventive or cure of tuberculosis, we really cannot quote anything specific in regard to cures.

In some thirty-five years of gypsum quarrying and manufacturing of gypsum products, during which time we have employed a considerable number of men, there has never occurred a single case of tuberculosis. The deaths which have occurred have in no instance been attributed to that disease. We have men in our employ at this time who have been with us as long as thirty years and with no tendency to this disease.

We have always understood that gypsum workers in England where the industry very much antedates American operations are marked principally for good health, including absence of tuberculosis, unusual physique and strength, which attributes are said to be inherited by their off-spring.

Joseph Reebach, assistant general manager, The Higginson Manufacturing Co., Newburgh, N. Y.—Our plant has been in operation as a gypsum plant for more than sixty years. I have not been here as long as that myself, but from all of the information that I can gather together we have had but two people in our plant afflicted with tuberculosis. The first employe we shall design as "X." "X" was about 30 years in our employ and after about ten years his arm was caught in a shaft and mutiliated. From that time on he began to show a decline. He hung on for 20 years, but during that time was active in his work, which was attending to the kettles in our old calcining department which have now been abandoned. This department was always more or less dusty, inasmuch as it was very old and

had no dust removing appliances. "X" had always been a very heavy drinker and it is the opinion of the employes around our plant that his death was really due to exposure rather than from the disease with which he was afflicted. It was customary to find him in all variously exposed places of the plant in a drunken condition.

The next employee we shall designate as "Y." "Y" was a stenographer and timekeeper and worked for us from 1900 to 1907. Our offices, while in the plant proper, are nevertheless quite a distance from the calcining department where most of the fine plaster dust is generated. While he would walk through the plant two or three times a day in keeping track of the men's time, nevertheless most of his time was spent in the office. While I never knew the man personally, nevertheless it is reported that he caught cold owing to the injudicious use of clothing during the winter time. In 1907 he was sent West by the gentleman who was then president of this company, but he returned in a year or so and died here in 1913 from tuberculosis.

The two above cases constitute the only ones to our knowledge where any of our employes had tuberculosis. The health of our average employe is good. For example,—we have one old gentleman in our calcining department,—in fact he is our senior calciner,—who is over sixty and has been in our employ for probably 30 years. He is always in the thick of the plaster dust and I do not understand how he is able to operate some times, inasmuch as his glasses are always covered. However, he is perfectly healthy and is much better preserved than some of the men of his age around town. We can also cite our superintendent as an example. He has been employed in this mill for over 40 years, is over 60, is in perfect health, and as a matter of fact is unusually robust for a man of his age.

I regard it as rather unfortunate that Dr. Tweddell has not been given more encouragement in his research work along this line. If there is any way in which we can help we shall be very glad to do so. Our gypsum is imported from our own quarries at Nova Scotia and is unusually pure and we grind a lot of it as calcium sulphate for various purposes. If Dr. Tweddell would like some of our product, we shall be very glad to furnish him with some very finely ground white gypsum. I mention color because it is generally indicative in gypsum of chemical purity. I shall look forward with great interest to your articles on this subject.

H. H. Van Hagan, operating manager, American Cement Plaster Division, The Beaver Products Co., Chicago, Ill.—During the writer's 18 years' experience in the gypsum industry, the question has frequently come up when employing new men as to whether or not the dust in the average gypsum plant is injurious to their health. Up to the last year I have never heard of a case of tuberculosis developing among any employes in this industry.

During the past year there have been two cases developed at our Gypsum, Ohio, plant. One of these cases was contracted by G.— W.— our mill foreman—the other case developed on A. S.—, our warehouse foreman. Due to previous experience the writer was particularly interested to determine the cause of these two cases, and I made personal investigation of the facts in each instance, developing that neither case could be attributed to mill conditions. Mr. W— home conditions were not of the best and developments indicated that his case developed through lack of proper nourishment and a general run down condition. As near as I could learn in the case of Mr. S—, his condition was brought on by fast living.

These are the only two cases which have come to my attention in a good many years and I think both of them can be well accounted for.

I will personally be interested in having any information which might be developed in connection with this article.

J. L. Hamilton, president, Alabastine Co., Grand Rapids, Mich.—We have no real available data on the subject except this, that while in our mills particularly in our plaster mill, there is considerable dust that the men seem to be inhaling from day to day, we have never in our experience had any bad results from it. We have men who have been in our employment for a great many years, and we have never had, as we know of, a case of tuberculosis.

Plants of this kind, particularly in winter, are very drafty and cold, but our men seem to be very free from any trouble of this kind.

I do not imagine that this treatment will ever come in very general use, but the writer can readily recognize that there may be a lot in it.

W. K. Squier, president, Oakfield Gypsum Co., Oakfield, N. Y.—This subject is not new to the writer, and we were urged to find a place for a man who is slightly affected tubercularly, by an eminent physician in New York (whose name we cannot recall at this time), who was looking for an opportunity to place the man in a lime plant, which led us to making some inquiry and we found it was generally believed that workmen in lime plants were free from tubercular trouble. We didn't know, however, that it applied to gypsum plants.

Gypsum Used in the Treatment of Tuberculosis

General Summary With Specific Applications of the Use of Gypsum

By Prof. George A. Olson
Gypsum Industries, Inc., Chicago, Ill.

NATURE when given an opportunity will check the advance of tuberculosis. In this process calcium serves as the barrier against further inroads as manifested in the calcified lesions which are walled off from the rest of the body. Accordingly a supply of calcium which is readily assimilated serves as a means for the control.

Calcium Increases Resistance

That calcium plays an important role is revealed in other ways besides that noted in case of calcified lesions. Beasely showed that subjects succumbing to the disease revealed a scantiness in calcium deposits. Labbe and Galippe found a decreased assimilation of calcium in tuberculosis based on the magnesium-calcium ratio in urine. Emmerich and Loew found that calcium administration increased the resistance toward tuberculosis and Rosler observed that calcium shortened the coagulation time of blood. Thro and Ehm reported high calcium content in cases of healed tuberculosis.

Tuberculosis Rare in Gypsum and Lime Plants

Significant as the above findings may be they are of no greater importance than the following ones. Out of 40,824 deaths from tuberculosis analyzed by Fisac in Spain 17 deaths in all or 0.41 per 1000 occurred among lime or gypsum workers. Grab showed that only 7.5 per cent of the total mortality of lime workers succumb to tuberculosis. Koelsch showed that among 400 workers in a German plaster of paris establishment no cases of tuberculosis occurred during a period of 17 years.

The study of "Lime and Tuberculosis" as published by Rockwood in this journal, January 14, 1922, is a most comprehensive and valuable document since it gives reasons supplemented with reviews for believing that the breathing of lime and limestone dust is actually beneficial to sufferers from the "white plague." Soon after this article was published Dr. Tweddell pointed out the need of calcium-

therapy in tuberculosis. The replies received by Tweddell from lime and gypsum manufacturers operating in the northeastern states and in Canada stated that no cases of pulmonary tuberculosis were ever noticed among the workers. One of these plants had been in operation 25 years and another more than 40 years. The scarcity of tuberculosis in lime producing districts was observed by Kechzeh as early as 1903.

In this connection it is also interesting to note the following statement by Kober and Hayhurst "While other kinds of dust may, and doubtless frequently do, produce a milder grade of pneumoconiosis and fibrosis, there is some evidence to indicate that the dust of coal, lime, gypsum and sulphur have an inhibitory effect on the disease."

Tuberculosis Frequent When Silica Is Inhaled

It is of much importance to know, according to Davies, that miners who inhale silica dust are especially susceptible to tuberculosis while those who inhale coal dust are not. Inhaled silica dust remains in place and gives rise to fibrosis and increased susceptibility to tuberculosis while with coal dust the epithelial cells detach and wander out. These views are supported by Haldane. The latter also states that coal dust or shale with quartz also detach cells.

Nieszytka reports that 76.5 per cent of all the deaths among the sandstone workers at Hanover, Germany, are caused by tuberculosis and that the average age is only 35.1 years.

Amount of Calcium Inhaled a Factor

Obviously a lowered vitality with a calcium food deficiency favors the development of the tubercle bacilli. In the incipient stages calcium-therapy should be expected to effect cure, while advanced stages require more calcium with the possibility that the demand for calcium would be greater than the quantity usually assimilated. It may be a localized condition where the cells around the tubercular area are unable to utilize the available calcium as pointed out by Halverson. Increased amounts of calcium required in case of fibrosis should also be considered.

Association of Phosphorus and Tuberculosis

A decrease in lecithin phosphorus with a simultaneous increase in the acid-soluble phosphorus observed in tubercular patients is regarded as a grave prognosis. This finding is very important and recalls observations made by the writer feeding rats mono-calcium phosphate. The lungs became involved and the resemblance of caseous tuberculosis developed in the entire group. Phosphorus and silica have chemically properties very much in common and phosphorus may for this reason, like silica or quartz, favor tubercular development. If this view be proved correct then it would follow that calcium phosphate would not be a satisfactory calcium source in nutrition.

Tuberculosis Rare Among Workers in Gypsum Mines and Mills

It is not to be expected that the men working in the gypsum mines would be as free of tuberculosis as would the men working in the mills where the gypsum dust permeates the air. However, the scarcity of tuberculosis among the workers in both the gypsum mines and mills indicates that miners must derive benefit in working in the mines. An incident recently brought to the writer's attention was in case of a man who had suffered two breakdowns. Since being put to work cleaning gypsum sacks, a very dusty occupation, he has never been further troubled with tuberculosis.

Gypsum Is a Specific

That gypsum is a specific in early pulmonary tuberculosis the same as quinine is a specific for malaria has been made use of by Tweddell. His method of treatment is unique in that the patients inhale the gypsum dust shot from a blower at specified intervals. It is a process very much like the one prevailing in gypsum mills.

Other Sulphates Found Favorable

Gypsum is chemically known as calcium sulphate. The sulphates of other alkaline earths such as dysprosium, praseodymium and neodynium have also been favorable for treatment of localized tubercular lesions as: tubercular adentitis, cutaneous tuberculosis, erythematous lupus, osseous tuberculosis and rhino pharyngo-laryngeal tuberculosis according to Grenet, Block, Drouin and Renon.

Possible Reactions of the Gypsum

The kind of action which takes place between the gypsum and substance in the body must for the time being be considered speculative. A part of the carbon diaxide which accumulates in the lungs combines with the calcium component of gypsum. As a result the other component, sulphuric acid, would be free to act first as an antiseptic and finally combine with either the sodium or potassium or both. These salts would be readily absorbed, leaving the soluble calcium to combine in such a way with the tissue as to form the calcium lesion. The effect of gypsum whereby phosphorus is changed to a less soluble state should favor recovery. It is also possible that calcium soaps form, which are not readly assimilated by the bacilli with reduced resistance as a result.

Gypsum Favored Source of Calcium

In as much as the workers in gypsum mines and mills do not suffer from tuberculosis with the further fact that gypsum has been employed in the treatment of incipient tuberculosis it appears that gypsum is the best source of calcium for treatment of tubercular patients. It should prove equally as valuable for the treatment of tuberculosis in cattle.

Gypsum a Means of Suppressing Tuberculosis in Cattle

The dissemination of gypsum dust in stables can be made practicable. It should tend to forestall spread of the disease and unquestionably should act favorably in the early stages of development where the lungs are infected. Thus the communication of the disease from animal to animal by direct and indirect contact would less likely occur. Success with this precautionary method would reduce the annual loss of cattle and aid in cleaning up tuberculosis in the herds.

The suppression of tuberculosis in cattle is of paramount importance in view of the fact that the bovine bacilli are exceedingly virulent. Less infection among hogs and other animals should occur. There should also be less tuberculosis in the poultry flock. But of far greater significance would be the reduction of human suffering caused by consuming raw infected milk.

Tuberculosis Not Found in Cattle Raised on Gypsum Lands

In the parts of the United States where the soils are entirely or largely made up of gypsum tuberculosis is not found in the stock and these places have also been found to be splendid places for the cure of tuberculosis in the humans.

Method of Using Gypsum in Barns

The sprinkling of gypsum on the floors, gutters and manure piles primarily for the purposes of absorbing the ammonia and improving the sanitary conditions in the stables has undoubtedly suppressed the spread of the disease in hogs and chickens. It has also had good effect on the health of the cows based on observations made by Eber and Hecker in Leipzig, Germany. The combined method of blowing streams of gypsum dust at various intervals and sprinkling gypsum on the floors and manure should prove considerably more effective than the practice of merely sprinkling the gypsum on the floors and in gutters.

Conclusion

In conclusion I wish to express thanks to Mr. Rockwood, who forcibly pointed out the good effects of lime in cases of tuberculosis, Dr. Tweddell for the valuable literature and information which he supplied me and to Dr. Ravenel, public health service and the army and navy medical staffs for references to literature embodied in this article.

Mining and Quarrying Compared by an Engineer Familiar with Both Operations

Part 3—Mining Methods Used in Quarrying Limestone and Their Application to Various Local Conditions

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ROBERT PEELE, in the "Mining Engineer's Handbook," p. 683, gives a table showing the application of various underground methods to various conditions. Among these for thin beds of flat dip, with strong ore (limestone) and strong walls are:

Breast stoping (Fig. 1).

Systematic room and pillar (Figs. 2 and 3).

Open overhead stopes (Fig. 5).

Coal mining methods.

For thick seams he gives:

Breast and bench stoping (Figs. 4 and 6).

For massive orebodies such as very thick limestone beds:

Underground glory hole (Fig. 9).

Pillar and chamber (Fig. 3).

Shrinkage stopes (Figs. 7 and 8).

Together with other methods involving timber, waste filling, or caving.

In my definition of a breast stope above I have used the word *tunnel* in the sense used by most quarry operators, and not as designating a tunnel in the narrow sense of the word.

Breast Stoping

Breast stoping is a name applied to a method used in mining horizontal or flat dipping orebodies. It is applied to deposits of usually less than 12 ft. in thickness, although deposits have been and are being worked up to 20 ft. thick by this method. The term is also applied to the working of thicker deposits where the breast is carried above and ahead of a bench or underhand stope. (Fig. 4.) In either case it involves the use of permanent pillars which in the case of limestone mining would be of the limestone itself. These pillars being left at irregular intervals can be recovered only with difficulty and therefore represent a potential loss of available stone.

Slabs of rock scaling from the roof between pillars often cause serious danger. In thin seams they can sometimes be held in place by vertical props. In thick seams they must be removed before advancing the breast. Scaling of the back can sometimes be avoided by drilling vertical holes up into the back. This allows the accumulating water to escape from the partings of the strata before exerting enough pressure to scale the back.

Breast stoping is justified when applied to cheap material of which much can be left in pillars, on account of its simplicity and cheapness. Where properly applied it yields a maximum of profit in spite of the loss in pillars. Often times however, when used by inexperienced labor, holes are drilled indiscriminately without regard to proper breaking and a loss is incurred in the excessive use of dynamite. Hand loading is usually employed with this method and haulage ways are crooked. Clean material is obtained and careful selection can be had.

In the room and pillar method (Fig. 8) pillars are laid out on regular lines both longtitudinally and transversely. Because of this headings are usually carried forward by systematic placing of holes for each advance. This tends to efficiency and safety. This method like the breast stope is suitable for thin bedded deposits which extend over large areas. By systematic spacing of pillars much of the material left in them can be recovered if desired. Where pillars are to be left a strong roof and floor are essential. The disadvantage from excessive use of explosive is here not as apparent because of the necessary systematic placing of holes in heading or face. The advantage of careful selection and clean material are applicable and the haulageways can be kept straight.

Open overhead stopes (Fig. 5) applied to limestone mining are suitable for thicker beds. The placing of holes pointing upward into the back (roof) must be carefully done

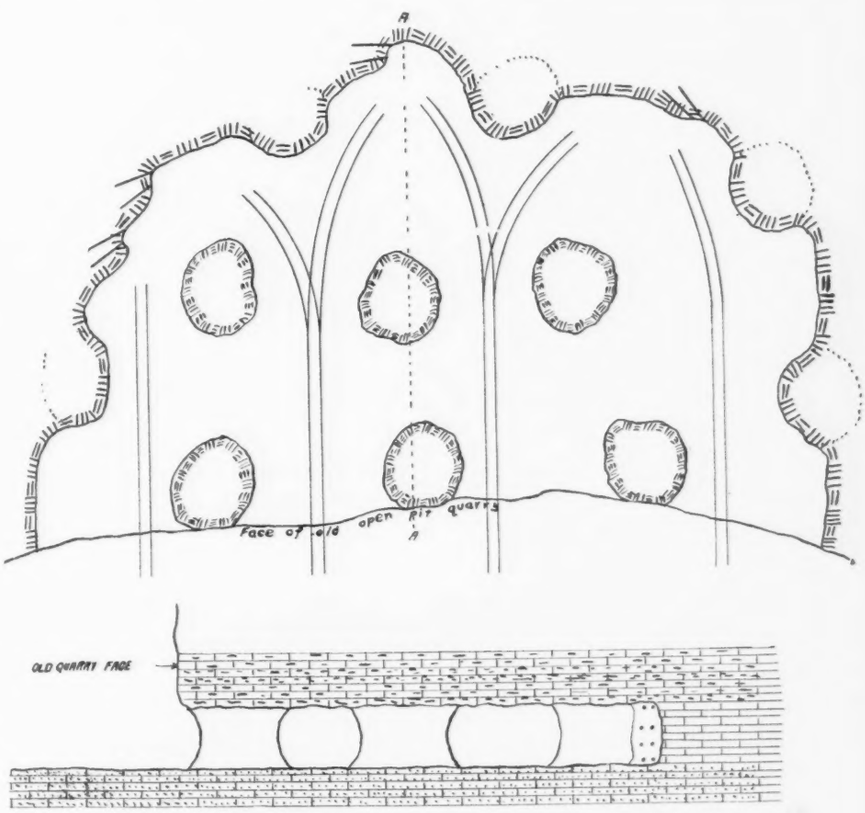


Fig. 1—Plan (above) and section (below) of a limestone mine worked by breast stoping showing pillars and tracks. This method is usually applied to bodies less than 12 ft. in thickness

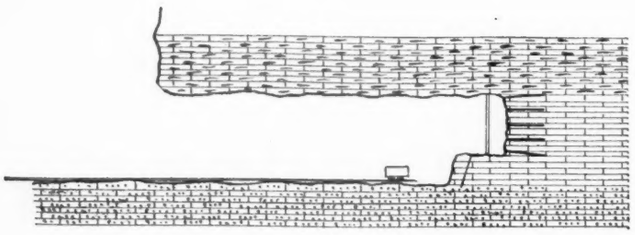


Fig. 4—Breast and bench stoping (section)

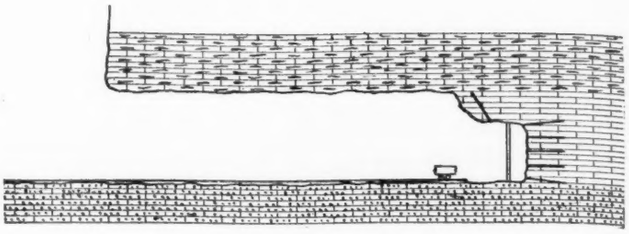


Fig. 5—Open overhead stope (section)

else there is a tendency to crack the back into dangerous slabs. If holes are drilled above the parting usually carried as the back the detonation of the explosive causes the gases to escape through partings above the back and thus loosens the slabs. Where there is no distinct parting between the good and poor stone this danger may become excessive and some other method must be used. Its advantage lies in that after

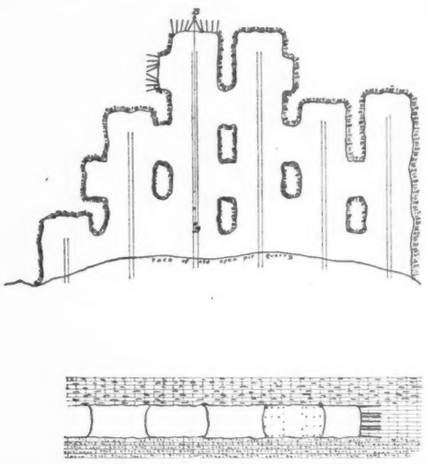


Fig. 2—Systematic room and pillar working shown in plan and section

blasting the rock is left in a pile ready for the mucker or shoveler and not in the way of the driller. The driller drills the upper holes from the same set up as that in which he has drilled his breast holes and does not have to carry drill, column and tools up onto a bench as with the underhand stope. The thickness of the strata that can be successfully worked by this method is limited to that that can be reached by a single set of upper holes. As a rule less explosive may be used in this method because the stone above is free to break and has no accumulation of broken stone on it as is the case in the underhand stope.

Coal mining methods are mostly modifications of room and pillar methods. In foreign countries the longwall method is used extensively but this method involves usually the practice of caving the back which will apply to limestone mining only in isolated cases and will not be taken up here.

The combination of breast and underhand or "bench" mining (Figs. 4 and 6) has many advocates for application to limestone mining. It has the advantage of leaving a good roof over the workmen but in the case of bedded deposits ranging up to 40 or 50 ft. in thickness this is not so pronounced. Constant care must be exercised in the use of high backs that slabs do not become dangerous. In Fig. 6 is shown one method of hanging a ladder on ropes fastened to eye bolts in the floor. From these ladders men can inspect the back and take down dangerous ground. The broken rock produced in advancing the breast is thrown onto the lower benches and must be removed before the driller can set up his machine. This work is in some places done by the muckers or shovelers but in most cases is done by the drillers themselves. As the drillers are usually higher paid men there is here involved an unnecessary expense. Almost invariably the lowermost bench in this system is drilled "blind." By that I mean the driller cleans off the top of the bench so he can set up his drill but the mucker does not get the resulting pile on the floor cleaned up till the end of the shift. As a result the driller must drill his holes without being able to see accurately just how much burden he is putting on them. If he gets too strong a hole not only is the explosive used wasted but time is lost in redrilling the ground and delay to the muckers.

With the old type of piston drills, holes looking upward, were more difficult to drill because they were "dry" and caused a more rapid loss in the gage of the steel due to the heating of the drill and the dust. This prejudiced the driller in favor of the underhand stope. With modern hammer drills this difficulty has been overcome and in fact it is a question if, with the water type machine, the upper holes are not faster and easier drilled.

Another disadvantage of this underhand

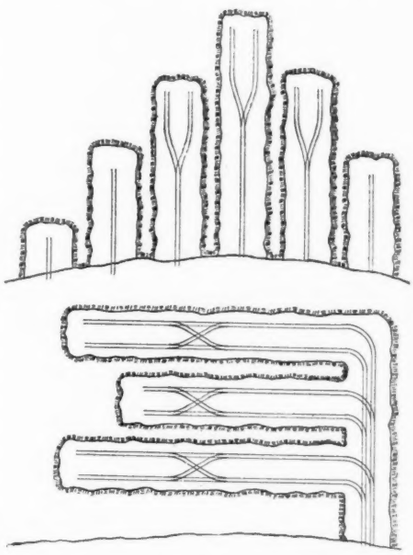


Fig. 3—Room and pillar system with rib or chain pillars

method is that the drill, drill column, hose, and tools must be removed from the working face when blasting. Carrying these up and down underhand stopes is not only hard work but involves considerable time. The main advantage is that operations can be confined to one opening or heading if desired.

Glory hole mining (Fig. 9) is also known as the "milling" method. It is essentially

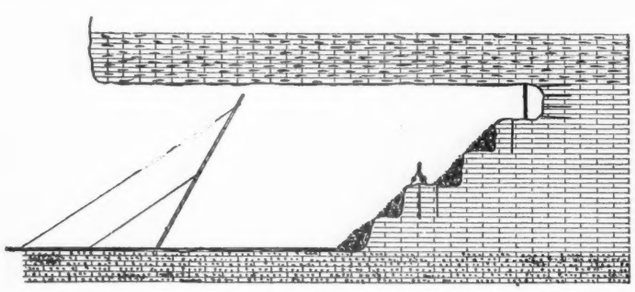


Fig. 6—Another form of breast and bench stoping

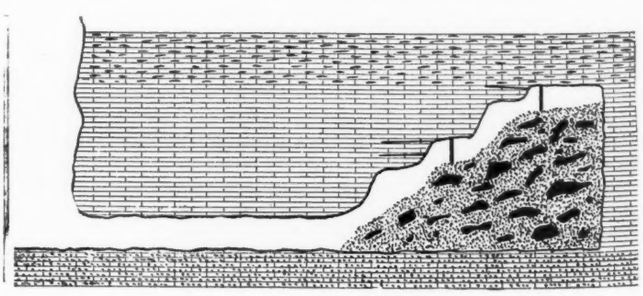


Fig. 7—Back stoping over shrinkage stope

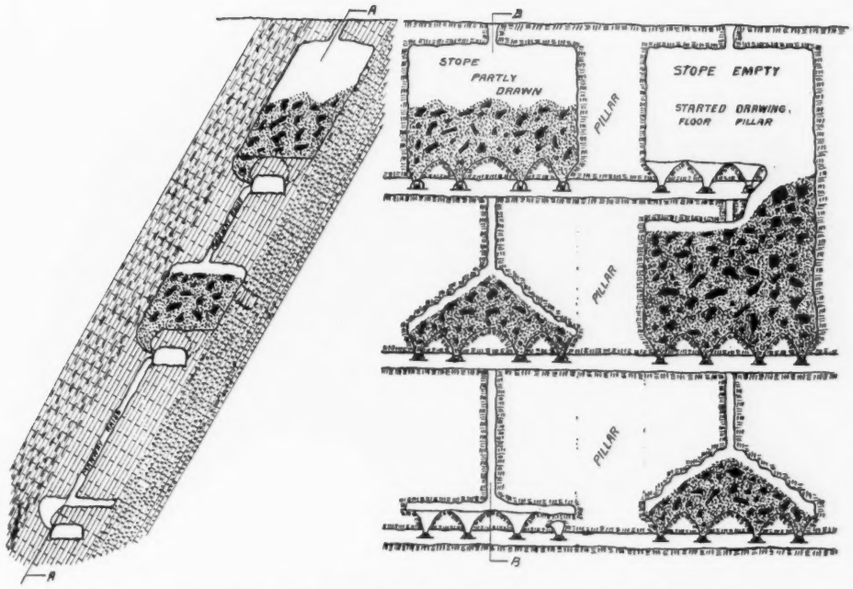


Fig. 8—Method of mining from almost vertical strata used in some Eastern limestone mines

an underhand stope without the breast. A raise is usually driven up from a lower level and when sufficiently high it is widened at the top and stoping begins. Benches are carried down in rough concentric circles or elipses. The same disadvantages apply as to accumulated rock on the various benches as in other underhand stoping. The general slope of the stope bottom must be kept steep enough for the rock to move by gravity to the raise below. Its biggest disadvantage, however, lies in the fact that as work progresses and the rock is taken out the men get farther and farther away from the roof or back which finally becomes inaccessible and accordingly dangerous. An advantage of this system is that no shoveling (except on benches) is done. The broken material is loaded directly into cars from chutes at the bottom of the raise.

Raises at times become clogged with material broken too large to pass through and often times before this is noticed there has accumulated at the top a large amount of broken material. In order to open the raise it then becomes necessary to either move this accumulated material by hand or enter the raise from below. This latter is a very dangerous procedure and is forbidden by most mine inspectors as well as mining companies.

Where properly operated the method furnishes very cheap material. Selection of material can be made by the use of shovel platforms instead of chutes for loading cars and in general where material in large chunks is handled the writer's experience shows very little difference in loading cost between the shoveling platform and the chute. Where the material is uniformly of a size to pass the chute without difficulty and no sorting is required there is of course no comparison in cost, the "milling" method being much cheaper.

The "pillar and chamber" method of mining is capable of many modifications or in another sense the term is far reaching. For instance, Figs. 2, 3, 4, 5, 6, 7, 8, and 9 are all pillar and chamber mining, although of different forms. A strict definition of the term refers to a system of mining (not illustrated) whereby a massive ore body is cut up into rooms and pillars both horizontally in the pillars to provide support for the tally and vertically. Enough ground is left enclosing walls and the balance excavated in the form of rooms or chambers between pillars. This method necessarily leaves a large percentage of ground in pillars and for this reason is applied primarily to the recovery of rock salt and similar cheap minerals. A combination of this method with the shrinkage system leaving weak pillars (temporarily supported by the broken shrinkage) that will collapse or cave after removing the broken ground might be applied to thick beds of limestone under certain conditions. By this means a large proportion of the material could be recovered with only a secondary breaking cost. Such a combination would closely resemble the cheap caving methods used in mining soft ores.

Fig. 8 illustrates a method of mining limestone from steeply dipping strata similar to the method in use by some Eastern limestone producers at the present time. The illustration shows quite clearly the different steps in the cutting of rooms or chambers, preliminary development work necessary, operation of stopes on shrinkage and removal of floor pillars. The rib or chain pillars can be removed after the broken material has been drawn off, by driving raises up through them and blasting radially from these raises. In this manner a large number of holes are shot simultaneously. When this is done the surface caves of course. If there has been much poor stone or overburden left as a capping this will mix with the broken pillars and only part of the pillars can be recovered in clean stone.

Back stoping over shrinkage has much to

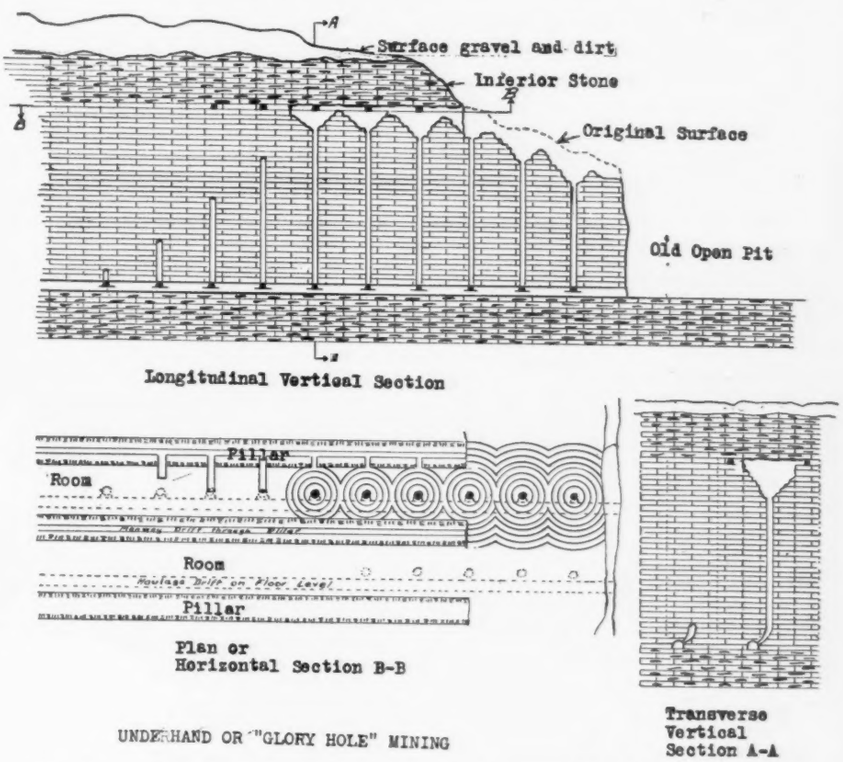


Fig. 9—Underground glory hole system used in very thick beds of limestone. It requires no shoveling

recommend it. Men are at all times close to the back whereby constant watch can be had for dangerous ground. Ventilation is good. Breaking holes are placed horizontally in the back and thus the weight of the stone itself helps break the ground. Hand loading can be dispensed with entirely unless it is necessary to sort the spalls from the larger pieces. By careful block-holing immediately following each blast large pieces are eliminated and the chutes feed free. Ample storage is provided for unforeseen contingencies. The method is safe and cheap. Much expensive development work must be done ahead of actual stoping which requires considerable capital outlay. Large massive bodies or very thick beds are necessary to warrant the development cost.

This method is by no means limited to inclined strata but is equally applicable to very thick bedded deposits. If the reader will turn to Fig. 9 and picture the reverse of the operation illustrated, *i.e.*, stoping started from the lower level and proceeding upward rather than down, he can readily visualize the procedure.

Fig. 7 illustrates a method of applying back stoping over shrinkage in bedded deposits too thin to warrant extensive preliminary development. By this method several tunnels are started progressively by carrying a low breast stope or room (as shown in Fig. 3). Having driven the room ahead what has been predetermined to be an economic distance a raise the whole width of the room is started at the face and driven to the upper extent of the good stone. Upon completion of this raise back stoping is started in this room while the other rooms are advancing their breast stopes. Holes drilled horizontally and parallel with the bedding planes of the stone frequently break far beyond their bottoms thus producing a cheap explosive cost. Muckers and drillers do not interfere with each other. Drillers are at all times close to the back and can arch or trim the ultimate back carefully without ladders. When the back stope has returned to the original starting point of the breast stope the room is left full of broken rock ready for the plant. The back is now permanently trimmed or arched after which the broken stone is removed as needed.

When the room is empty the drillers return and advance the breast stope as before. By the use of several rooms or tunnels the cycle of operations can be so arranged as to provide ample storage of broken material and a minimum of interference between different classes of labor. To the best of his knowledge this particular system as applied to limestone recovery originated with the writer and has proved very successful in at least one quarry. The system is quite flexible in that hand loading can be used where careful selection of stone is required or the steam shovel can be used in cleaning out the filled stopes when breaking has been completed, or a small mechanical shovel can be used in the breast stopes. The higher cost of the original breast stopes is more than offset by the extremely low cost of breaking the back. This system was started by the writer in 1922 at Ste. Genevieve, Mo., for the Peerless White Lime Co., which is subsidiary to the Hunkins-Willis Lime and Cement Co. of St. Louis, Mo., and has been successfully continued since that time with, I am assured, very gratifying results.

Where deposits of limestone occur having little or no overburden various methods of stripping have been employed ranging from the day laborer with pick and shovel using wheelbarrows or wagons for transportation, to elaborate steam shovel and locomotive haulage systems. For particularly rough surfaces the clamshell has been successfully employed and in other cases the dragline has proved most efficient. In still other cases the surface has been removed by hydraulic giants. This latter system is probably the cheapest where it can be applied.

Where the overburden of residual clays or gravels lies directly on the stone to be quarried a simple removal of the overburden prepares the material for open pit working which will probably return the lowest operating cost under ideal conditions. If delays due to weather conditions, sorting of stone, or any combination of the ten cases sited in a former paper are considered, however, the question of relative cost assumes a different aspect and it is my purpose in a later article to correlate the costs of various open pit and underground quarry operations under actual operating conditions and compare the same. While it is true that under a certain set of conditions open pit mining or quarrying has no equal it is equally true that under a different set of conditions underground methods are far superior. There is, however, a vast middle ground where the system to be employed is debatable. In this field one or perhaps a combination of both methods, modified to fit the particular local operation, may be most efficient. In this field technical assistance from an experienced mining engineer can be most valuable.

Many quarries now closed may possibly, after careful survey, prove dividend payers by the installation of a modified scheme of operation. Many quarries now operating at a profit can be operated at increased profits by a change of methods. The writer has visited many quarries where the application of a little technical knowledge would have been of great benefit.

The matter of actual cost per ton is relative. Under one set of conditions a cost of $1 per ton may be excessively high while in another case it would be extremely low. Markets vary in different parts of the country and while a quarry might pay at one point it would be a hopeless failure at another. The writer has seen ore much harder than limestone mined and brought to the surface from 600 to 1000 ft. underground for less than 50 cents per ton and he has also seen limestone quarried in an open pit at a cost of very close to $2 per ton. Both operations were making money. Doubtless many quarry operators can cite instances where an operating cost of $1 per ton would drive them out of business.

The recovery of limestone from underground is not necessarily confined to the few methods sketched here but these have been picked out as those most often applied. Many other methods as well as various combinations may be used to great advantage to solve a particular problem.

U. S. Gypsum Company Prospecting California Gypsum Deposit

GEO. H. NORTON, field engineer for the United States Gypsum Co., arrived in Blythe, Calif., recently, accompanied by G. J. Kappes, expert driller. Their work embraces sinking test holes over the immense deposit of gypsum, twenty miles northeast of Blythe near Mineral siding, to ascertain the exact quantity of that material. The necessary machinery has already arrived at Blythe; with it they will be able to determine the formations to a depth of 300 feet.

Mr. Norton spent several weeks estimating this deposit from surface indications during the month of March of this year.—*Blythe (Calif.) Herald.*

Storm Damages New York Gypsum Mills

THE same electrical storm that caused the destruction by fire of the Akron (N. Y.) plant of the General Crushed Stone Co., noted elsewhere in this issue, also caused the destruction of the power plant of the Noble Gypsum Co., and one of the shops of the American Cement Plaster Co. was struck by lightning. About 100 men were at work in the shop but none was injured.

Georgia Cement Plant Resumes After Flood

THE Georgia Cement and Stone Co.'s plant at Portland, Ga., is once more running nicely after the deluge which put everything out of order, the water being waist-deep all through the plant. The same night fire broke out in the plant, but was put out before serious damage was done.—*Cedartown (Ga.) Standard.*

Alabama Gravel Rate Cases Settled

CASES pending before the Alabama Public Service Commission involving a reduction in rates on sand and gravel from Montgomery, Cooks, Arrowhead, Mount Meigs, Rice, and Chehaw to Tallahassee and Asberry, Ala., were settled recently by agreement between the shippers of the Western Railway of Alabama and the Birmingham and Southeastern Railway.—*Birmingham News.*

Duluth Crushed Stone Company's Plant

A Hillside Plant, Without Elevators, Which Has an Unusual Installation of Crushers

By F. A. Alter
Of Rock Products' Staff

THE Duluth Crushed Stone Co. was organized in 1903 and its original plant was in service until 1920. By that year the city had grown so near the plant that quarry operation was difficult, so a new quarry site was sought and found in a 200-acre tract, 2½ miles west of Gary, which is an industrial suburb of Duluth. This site is one-half mile beyond the present city limits, and a large wall of rock situated between the quarry and property which may some day be built upon serves as a buffer to the noise and shock of blasting.

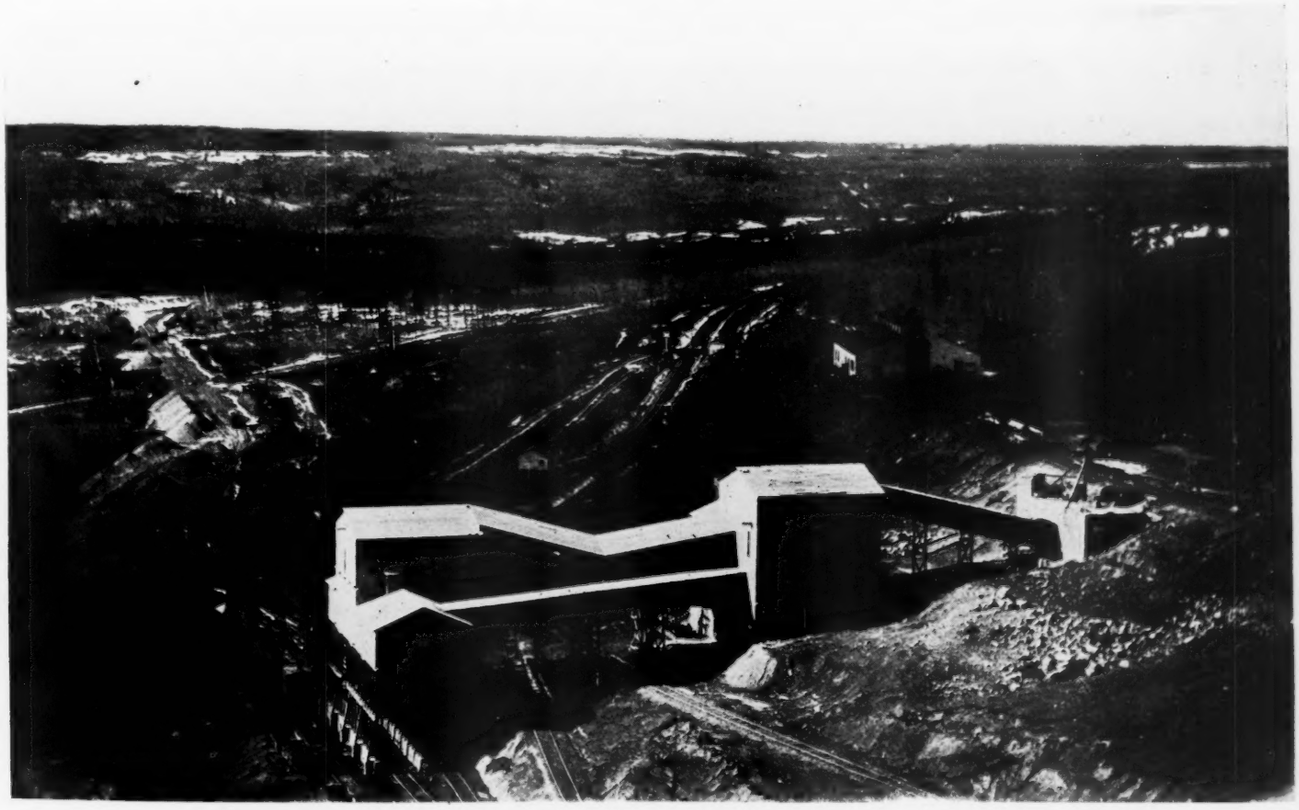
Detail of plant was designed by engineers of the Allis-Chalmers Manufacturing Co., Milwaukee, and is probably the first complete plant installation of the Allis-Chalmers Type N crushers. The features of the N type of crushers are a shorter shaft than usual, and a forced feed lubricating system The plant was designed for 3500 tons in 10-hrs. but it is expected that it will be several years before this production is reached. At present, the daily production is about 1300 tons with a crew of about 40 men, including those employed in the repair shops and in general work.

The rock in the vicinity of Duluth is unusually hard. It is a gabbro, which is of plagioclase feldspar and rich in lime.

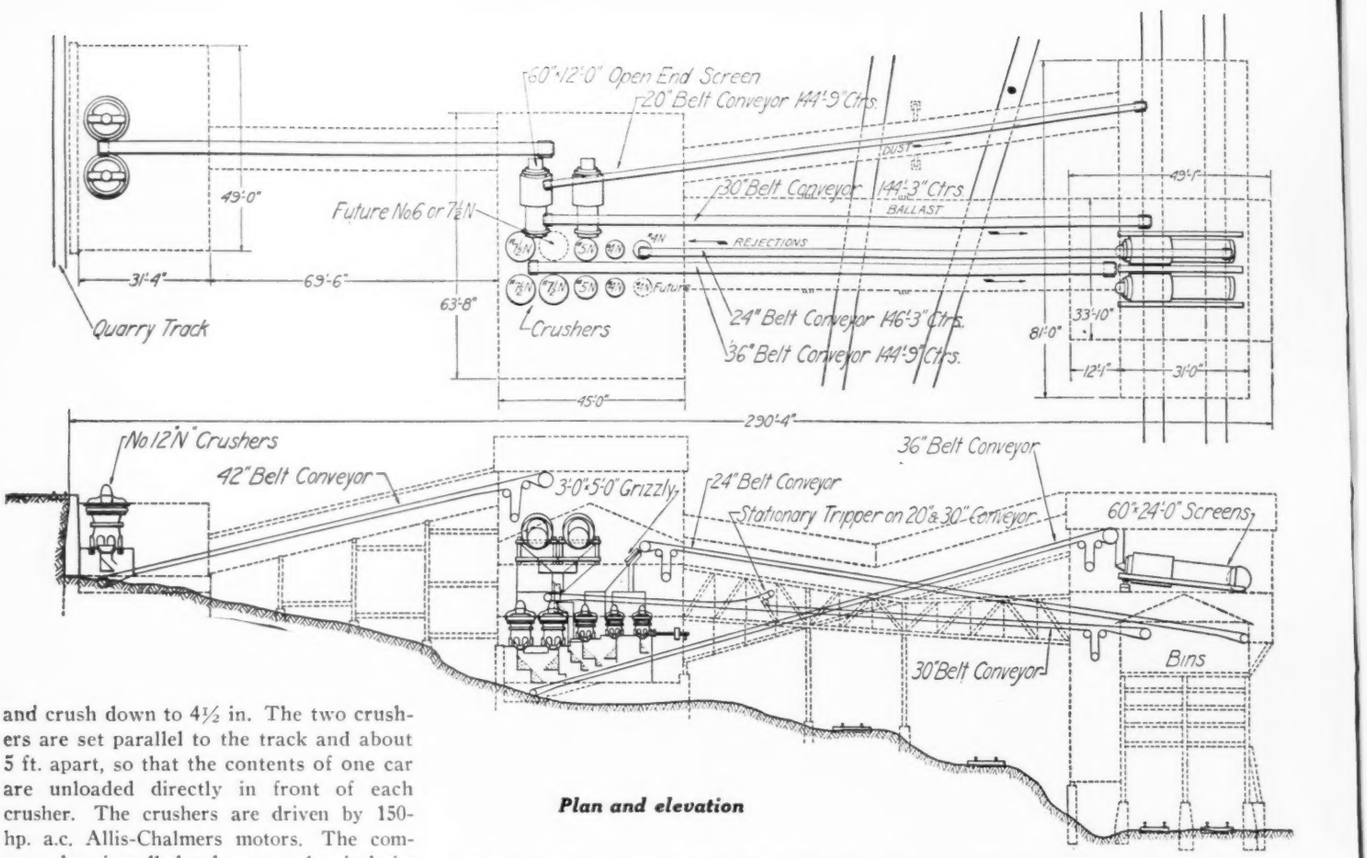
In blasting, two Sanderson - Cyclone drills are used for drilling. The accompanying diagram shows the details of the blast, which occurred on April 1. According to Mr. Brewer, secretary of the company, it was the most successful blast yet made and was expected to average better than 8 tons to the pound of powder used. As a result of this particular blast, an entire section of the face of the quarry was shoved away from the main wall and flattened out so that it was no higher than the boom of the shovel. It was also so well broken up that comparatively little pop shooting was necessary. The actual amount of powder used in this shot was 8,850 lb., of which 3500 lb. was 60%; 5 050 lb. was 40%, and 300 lb. was 80%. Trojan and Dupont, 5x10 cartridges were in 50 lb. cases.

Sullivan and Ingersoll-Rand jackhammers are used to drill for what pop shooting is necessary and mud-capping is also practiced.

A 3½-yd. 88C Buycrus shovel loads the rock into trains of 12-yd. Western side-dump cars, and two cars at a time are hauled to the primary crushers by a 15-ton Porter steam locomotive. The cars are dumped by air from locomotives directly into the primary crushers, No. 12N Allis-Chalmers arranged about 6 ft. from the siding and about 2 ft. below the level of the track. These crushers handle up to a 27-in. piece,



Plant of the Duluth Crushed Stone Co. The sloping site permits a plant design which has no elevators. Note the storage pile at the left

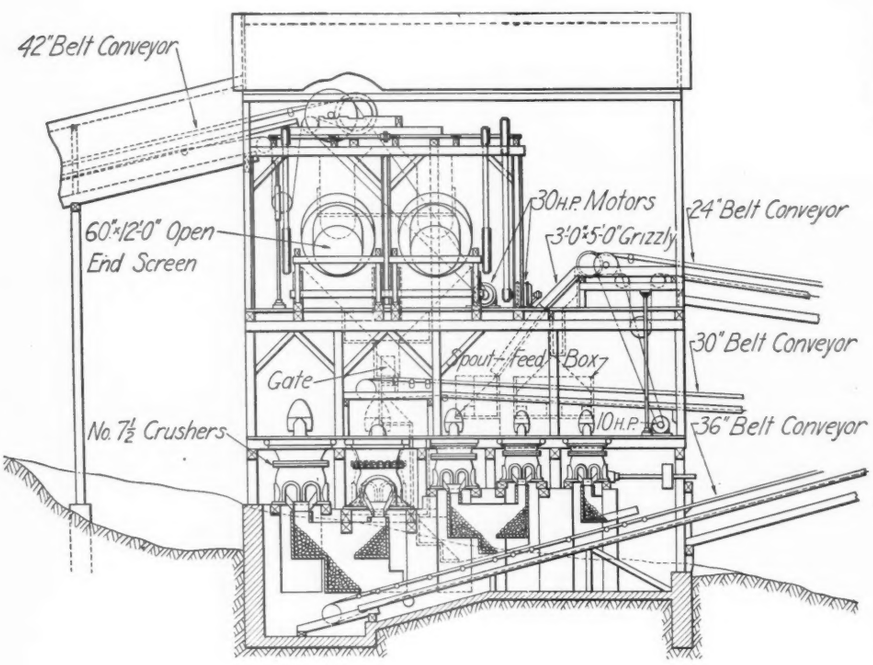


Plan and elevation

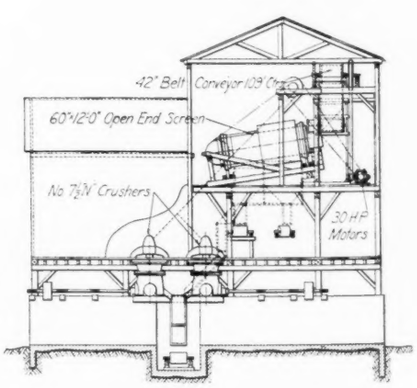
and crush down to 4½ in. The two crushers are set parallel to the track and about 5 ft. apart, so that the contents of one car are unloaded directly in front of each crusher. The crushers are driven by 150-hp. a.c. Allis-Chalmers motors. The company has installed a home-made air hoist to take care of large pieces.

The primary crushers discharge on a 42 in. Caldwell belt conveyor with 109 ft. centers. This belt, which is driven by a 30-hp. a.c. Allis-Chalmers motor, discharges into two 60-in. by 12-ft. open end scalper screens equipped with dust jackets. The dust and dirt from the quarry is discharged into a small conveyor which takes it to a special bin. This fine dust is principally used in road dressing.

The scalping screens also separate the railroad ballast, which is taken by a 32-in. by 144-ft. Caldwell belt conveyor to the loading bins. The scalping screens have 2½-in. perforations and material passing through can be taken by a 32-in. conveyor directly to a railroad ballast bin or passed around the 7½N crushers directly to the 36-in. conveyor. Oversize from these screens drops into three No. 7½ N type crushers, driven by individual 100-hp. a.c. Allis-Chalmers motors, which crush it to 2½ in. The product of the 7½'s, is conveyed on a 36-in. by 144 ft. Caldwell belt conveyor to two 60-in. by 24-ft. screens. Conveyor and screens are driven by one 75-hp. a.c. motor. These Standard iron frame screens with dust jackets separate

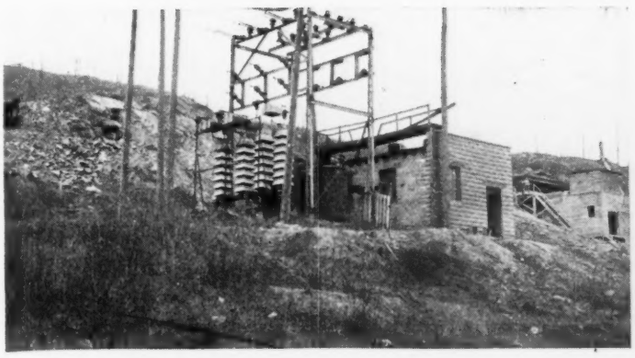


Section through secondary crushing plant



End section of secondary plant

everything under 2½ in., and discharge into separate bins, the sizes being ½-in., 1¼-in., 2-in., 2½-in.) which are placed directly underneath the screens. The ma-



Left—The transformer. All machinery is driven by electric power. Right—The primary crushing plant and 42-in. conveyor to scalping screen

Left—The storage pile from which the material is recovered by locomotive crane. Right—Secondary crushing plant with house for scalping screen above

terial through the finishing screens as well as oversize can be returned by a 24-in. conveyor to the battery of 4N and 5N crushers. These crushers discharge to the 36-in. conveyor, carrying material from 7½N crushers to finishing screens. Oversize from these screens is returned to two 5N and two 4N crushers for fine crushing. The discharge from these crushers is conveyed to the bin room by a 24-in. Caldwell conveyor, with 144-ft. centers, driven by a 10-hp. motor.

The entire plant was laid out and designed to be able to produce any combination of sizes which might be desired. This was brought about by the arrangement of spouts leading from stone boxes beneath the various screen sections and the sizes of screen sections in the finishing screens.

It is to be noted that there is not one elevator in the entire plant. This is possible from the contour of the plant site. The quarry floor is located about 80 ft. above the level of the loading track underneath the bin room, and hence the primary crushers are about 80 ft. above the tracks also. This is clearly shown in the accompanying pictures.

Materials from the bins are hauled to the storage piles in steel ore cars. A 25-ton, Ohio locomotive crane equipped with 2½-yd. clam shell bucket, and 60-ft. boom is used for unloading the filled cars and storing the material into piles alongside the track. For switching, loading freight cars, etc., and other general heavy work, a 25-ton Porter steam locomotive is used. Loaded cars for shipment are weighed on a new 125-ton Fairbanks registering type scales.

The company secures its power from a hydroelectric power station about 20 miles distant on the St. Louis river. It comes in at 33,000 volts, and is stepped down to 440 volts through three 500 kva., outdoor type single phase, 25 cycle transformers. All the motors used in the plant are the three-bearing, 25C, 440 v., 3-phase Allis-Chalmers.

A complete repair shop to take care of emergency repairs and also do general

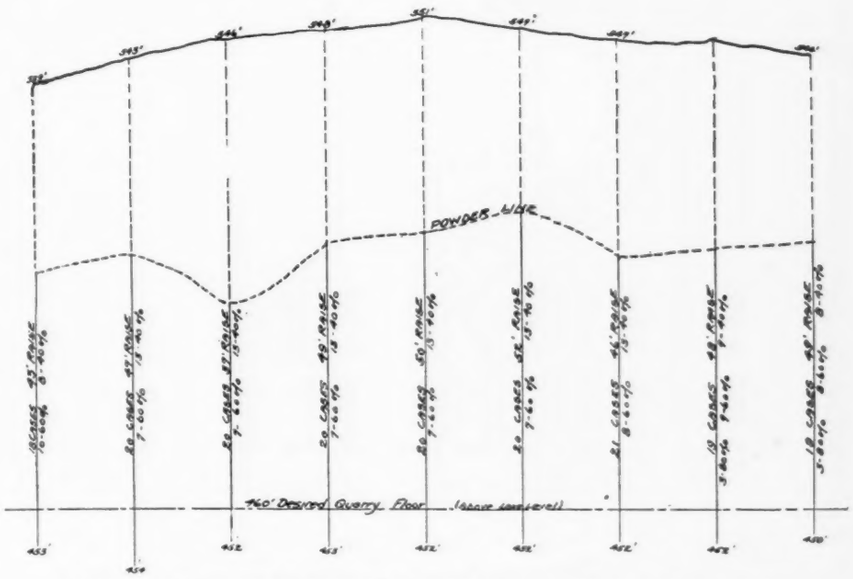
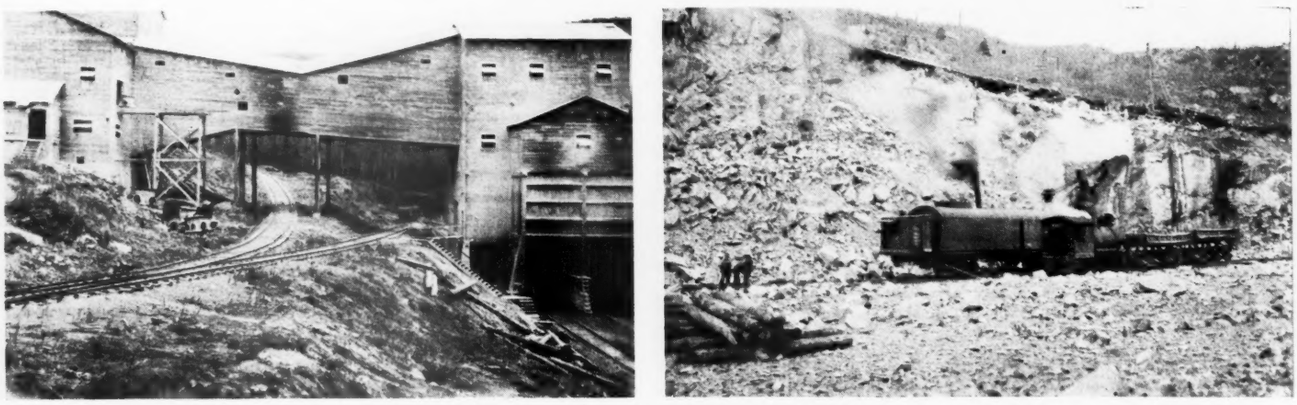


Diagram of blast which brought down 8 tons of rock to 1 lb. of powder

View of plant from storage piles. Machine and repair shop in background



Left—The final screening plant and bins over track. Right—Part of quarry face with steam shovel at work

overhauling on the shovels, etc., is maintained by the company. Equipment includes forges, lathes, drills, hammers, etc.

All of the air required for drilling and other purposes is furnished by an Ingersoll-Rand, 2-stage air compressor, directly driven by a 350-hp. motor made by the Electric Machinery Co., of Minneapolis. In operations last winter, the company for a time used compressed air for operating one of their shovels. No data was kept in order to compare the cost of the method with steam, but it proved itself to be very satisfactory during the emergency period that it was used.

Officials of the company are F. A. Brewer, president; C. K. Dickerman, vice-president; C. D Brewer, secretary and treasurer, and C. Hosted, superintendent. The general offices are located in the Alworth Building, Duluth. The old plant has not been abandoned but is being worked on a small scale until maximum production is attained in the new.

Some of the crew of the Duluth Crushed Stone Co.

Cannot Work Prisoners in an Outside Stone Quarry

THE Indiana Reformatory has no legal authority to work prisoners in a stone quarry outside the walls of the institution, U. S. Lesh, attorney-general of Indiana, said in an opinion to the institution's board of trustees.

A stone quarry was in operation on the tract acquired by the formatory relocation site and it was the intention of interested state officials to work prisoners in the quarry. The legal department could find no authority in law for such outside work, Lesh said.

Governor McCray had made arrangements with the company owning and operating the quarry for the state to buy the machinery. The arrangements which he made now are under investigation by Governor Branch and, it is said, there was no basis in law for the arrangement.—*Indianapolis News.*

Lime in the Treatment of Trade Wastes*

A Summary of Current Engineering and Chemical Practice

By R. H. Ferguson
Ohio State University, Columbus, Ohio

SEWAGES contaminated with various kinds of liquid discharges which are commonly called trade wastes have become a major problem to engineers and manufacturers during the past three or four decades.

In the year 1909, Fuller (1) called attention to the fact that chemical precipitation had a large application in this field, especially as a preparatory treatment, although consideration at that time was centered mainly around certain biological treatments. Since then the idea has been growing that chemical precipitation is the logical method to use in treating many types of industrial effluents.

From a survey of the literature, it would appear that lime has been used in some connection—although generally as a precipitating agent—in treating almost every kind of trade waste.

Various Uses of Lime

The uses of lime in the treating of these wastes, may be classified in general under the following heads:

(a) As a precipitating and coagulating agent.

(b) As a neutralizing agent for acid and similar wastes.

(c) As an agent to better the physical condition of sludge or to produce a sludge of fertilizing value.

(d) As an alkali to give the optimum pH for a given precipitant to act effectively, or for biological action to take place.

(e) As an electrolyte and chemical precipitant in the electrolytic treatment of sewage.

Lime as a Precipitating or Coagulating Agent

Lime came into extensive use as a precipitating and coagulating agent about the middle of the 19th century, in England.

Before that time sewages had been treated by plain sedimentation and filtering processes. As time went on, industrial progress and expansion produced sewages of great concentration and containing various trade wastes, so that plain sedimentation and filtration failed to give proper clarification and purification.

Chemical precipitation was now resorted to, on rather a large scale, for the treatment of these sewages, and this method has continued up to the present time.

The first precipitating agent used in this connection was lime, generally added in the form of milk of lime. The amount of lime used varied at different places with the character of the sewage; sewage containing a certain type of trade waste requiring somewhat dissimilar treatment from that of a sewage containing a different trade waste.

In general, experience showed (1) that the best results were obtained by adding just enough lime to decompose the carbonates present and to neutralize the sewage. If too great a quantity was added, soluble organic salts were formed, causing a very putrescible and obnoxious effluent. If too small a quantity of lime was added, sedimentation took place at a very slow rate.

Besides lime other chemicals were tried, but the best results were obtained with lime or a combination of lime and iron salts. This combination was found to remove most of the soluble organic matter as well as suspended solids, since a flocculent precipitate of iron hydroxide is formed which is very efficient in carrying down suspended matter and coloring materials.

Full scale tests for the amount of lime required to produce certain results, have been the ideal way to determine the optimum proportions of lime or other chemicals to add to a given waste effluent. In actual practice in England, the quantity of lime necessary when used alone as a precipitant has been found to be about 15 grains per gallon of sewage treated. This amount of course varied with the quality of the sewage.

This lime precipitation process has also been in operation for a number of years in America, more particularly at Worcester, Mass., and Providence, R. I. The sewages at both of these cities contain considerable quantities of trade wastes and the process has been very satisfactorily operated.

At Worcester, Mass., over 7,300 millions of gallons of sewage were treated by this process during the year 1920. The amount (3) of lime used varies between 6 and 10 grains per gallon. No iron is added, since the sewage is high in trade wastes containing iron.

The results of Hazen's (4) experiments on such sewages as that just mentioned indicate that between 80% and 90% of the suspended solids can be removed in a retention period of 6 to 8 hours when correct preciciptation methods are employed and that a 97 to 98% bacterial reduction results.

Other processes of this general character are the Spencer aluminoferric process (5) which consists in adding aluminum sulphate and iron salts, with or without lime, and the so called ABC process in which lime, alum, clay and carbon are added to the sewage. These processes have given good results in some cases, especially with wastes that contain a good deal of colloidal matter.

From the results obtained England, Worcester and Providence, it would seem that the popular prejudice against chemical precipitation methods of sewage treatment are not entirely justifiable and that chemical precipitation methods if properly carried out, can be operated economically and efficiently.

Lime for Tannery Wastes

When we come to the treatment of such a typical trade waste as that produced by a tannery, we find according to Naylor (6) that in England, the various liquors from the tanning processes are precipitated with lime in a settling basin, after having been mixed, and are then run into aerobic filters. These waste liquors are made up of wash water from the preliminary washing process, lime dehairing waters, tanning pit liquors containing tannic and other acids, as well as pieces of skin and other putrescible matter, and are very obnoxious. The lime treatment assists in the deposition of the sludge and produces alkalinity conducive to the desired putrefaction on the filter. Here we see lime acting both as a precipitating agent and as an agent to give the alkalinity for the next step of the purification process.

In Massachusetts (7) the waste liquors from tanneries have been treated with slaked lime and then passed through sand filters. It is claimed that 60 to 70% of the organic matter is removed by this treatment and the effluent is in a satis-

*Paper read at the Sixth Annual Convention of the National Lime Association, White Sulphur Springs, W. Va., May 21-24, 1924.

factory condition to turn directly into the streams.

Lime for Woolen-Mill Wastes

The waste liquors from woolen mills contain fats, soaps, saponifiable matter, free alcohols and waste scouring agents. These wastes are thus high in suspended solids and mineral matter as well as grease and fats.

A method has been in operation (8) where lime and iron salts are added to decompose the fats and soaps so they can be recovered. The resulting liquor is said to be free from suspended matter.

Acid suds effluents resulting from the grease recovery from suds by sulphuric acid, have also been very successfully treated with lime. (8)

In Germany, a great deal of work has been done on the treatment of these woolen mill wastes with lime and colloidal clay. (9) There seems to be a definite field for this latter process which has not yet been fully developed. It will be seen that lime is almost the sole precipitating agent for this type of trade waste.

Lime for Dye Wastes

When we come to the dye industry we find a kind of waste that is very difficult, in most cases, to treat. Dye wastes are usually high in suspended matter and contain dyes, acids and other obnoxious material. At one dye plant (10) the waste liquor containing starch, soap, gums, dyes and acids, is treated with lime and alumino-ferric. About 4 grains of lime per gallon of sewage are used. The effluent is in an entirely satisfactory condition to discharge.

Brown has shown (11) from experiments on certain dye wastes, that when ferrous salts or alumina are used to treat the liquors, imperfect results are obtained unless lime is added also. That is lime is the requisite agent to use in treating the wastes from the dyeing industry.

In another series of experiments on the effect of different chemicals on dye liquors of all colors, (12) it has been demonstrated that the most efficient treatment was obtained by the use of lime and ferric chloride. These two agents gave excellent coagulation and removed the coloring matter. Other precipitants did not do so well except in combination with lime.

Lime for Paper Mill Wastes

Liquors from paper works operating on the alkali processes are very polluting, even after the soda has been removed. The wash liquors and other wastes are first strained to remove fibers of pulp. They then contain clay, soaps, soda, etc. The treatment next given them is sedimentation with the aid of milk of lime. (13) A very satisfactory way of treating these liquors also, especially if they are colored, is to add slaked (13) lime and ferric chloride. The flocculent precipitate of iron hydroxide drags down the coloring matter. The waste liquors from the sulphite process of paper manufacture, are usually high in organic matter and sulphur dioxide. The treatment consists generally, in a sedimentation process. (14) Milk of lime is added and the liquors after settling, are cascaded over towers to remove the sulphur dioxide gas.

Wastes from strawboard plants, which are high in organic, colloidal and suspended matter, have been treated by adding lime, running the liquor through a settling basin and finally through screened cinder filters. (15) This is a particularly difficult waste to treat since it contains a great deal of very putrescible matter. This method of treatment has given quite satisfactory results. On the other hand the activated sludge process has not been successful with this type of waste.

Lime for Creamery and Dairy Wastes

Wherever a chemical precipitation process has been used in treating creamery and dairy wastes, lime has been almost exclusively the precipitating agent. Indeed according to the German chemist Guth (16) "lime is the proper precipitant for all creamery waste products."

These creamery and dairy wastes are of three types (a) Fresh milk wastes (b) Butter milk wastes (c) Wheys. In large creameries, they are first treated with lime and then given a biological treatment. Lime and ferric chloride (17) have been found to be the best removers of the odors of milk wastes, which in the main are due to the decomposition of nitrogen compounds and to rancid fats. Most of the organic nitrogen can be removed by adding an excess of lime over that required to neutralize acidity and then passing the effluent over septic beds. The activated sludge and Imhoff tank processes have not proven satisfactory, in general, for this type of waste.

Lime for Canning Wastes

Wastes from the various canning processes have sprung into prominence of recent years. Many types and kinds of treatment have been tried but no method has proven entirely satisfactory from every standpoint. There seems to be an excellent possibility for the development of a lime treatment process in this field.

In New Jersey the wastes from tomato canning have recently been treated (18) with lime and ferrous sulphate. The Bulletin of the Illinois State Water Survey for 1913, gives the treatment for pea and corn canning wastes as being lime precipitation and neutralization, followed by sedimentation and filtering.

Lime for Starch Wastes

In the starch industry—that is in the manufacture of starch products from corn —the steep water is the main waste to be contended with along with cone and gluten water. These wastes are particularly heavy in total solids and besides are high in phosphates. The fact that the liquor is acid and that it contains nitrogenous matter, proteids and carbohydrates, gives fermentation an excellent opportunity to take place in a short time, and the liquor is thus difficult to treat both from the standpoint of time and chemistry.

Mechanical processes of treatment have failed utterly with such liquors (19) and chemical precipitation has been resorted to. Since these waters contain phosphates, lime may be added, forming a floc precipitate of calcium phosphate. It is thus unnecessary to add iron salts in order to get flocculent precipitating action. The lime is added in the form of milk of lime. A clear non-offensive effluent is produced. At the Argo starch factory in Chicago, it has been found that 11.7 lb. of lime are required per 1000 gallons of waste, to give the most efficient action.

These industries just given, represent only a few of the many manufacturing processes which produce wastes that are or might be treated with lime as the precipitating agent.

The possibilities for lime in this connection seem to be limited only by our ability to apply and develop processes efficiently and economically. In particular there seems to be an undeveloped but fertile field in the treatment of canning, dairy, sugar and paper mill wastes.

Lime as a Neutralizing Agent

One of the most obvious uses of lime is its neutralizing power. As a neutralizing agent lime finds application in treating acid wastes from pickling iron and steel products in the steel industry. The ferrous sulphate formed by the pickling process is usually removed by appropriate methods and the spent acid liquor is then treated with lime. The lime not only neutralizes the spent acid but takes down the suspended iron salts as well. (20)

Acid mine waters have become a source of pollution to many streams and are particularly detrimental to soil. They have been best treated with lime but there is need of accurate information on how to carry out the treatment effectively. (21)

Acid wastes in the dye industry and paper industry have also been treated effectively with lime. The lime does especially well if iron is present since the floc precipitate of iron hydroxide is formed, which drags down suspended matter and absorbs colors.

In short—wherever an acid or similar

waste is to be treated lime appears to be the agent to use, both on account of its efficiency and its relatively low cost.

Lime to Better the Physical Condition of Sludge or to Produce Alkalinity

Another application of lime is in the treatment of certain kinds of sludge in order to better their physical condition and thus make them easier to handle. The filterability of sludges from the various sewage treatment processes, such as activated sludge, Imhoff tanks, Miles acid and similar treatments, is a growing problem. The use of lime to improve filterability and physical condition of certain sludges has been tried in some cases. However more research is needed along this line.

The addition of lime to Miles acid sludge has given good results. The sludge before the addition of lime (22) is quite acid and dries very slowly, but after the lime treatment it filters well and dries rapidly.

In some cases sludges nitrify exceedingly slow. (23) Experiments on the addition of several substances such as silica gel and clay gave no improvement. The addition of calcium carbonate, however, gave marked improvement both in rate and completeness of nitrification, which indicates that alkalinity may be a determining factor. Experiments are in progress on the use of lime in this connection.

In Germany, Rohland has (24) developed a type of treatment called the lime and colloidal clay process. Trade and other wastes are treated by adding lime and finely divided clay of the plastic variety. This combination in contact with water forms hydroxides of calcium, aluminum, iron and titanium, which absorb coloring matter and settle out suspended material. The lime produces the desired alkalinity for the clay to act, and also is said to improve the physical condition of the sludge.

This process has been applied to the wastes from the dye, sugar, paper, tanning and soap industries. It is especially applicable to wastes containing coloring matter.

Lime as an Electrolyte and Precipitant in the Electrolytic Treatment of Sewage

Lime is now employed as an electrolyte and chemical precipitant in the treatment of sewage in the so called "Direct Oxidation Process" and the "Selo Process." These processes are based on the passing of an electric current through sewage to which has been added lime. Nascent oxygen and hydrogen are liberated within the sewage. These readily attack organic matter and destroy it.

These electrolytic methods have been applied in some cases to specific trade wastes. At least one demonstration plant has given satisfactory results and at least two cities are installing the system for permanent use.

Conclusions

These remarks do not of course exhaust the uses, or the possibilities for use of lime in the treatment of trade wastes, either as a precipitating agent or in some other connection. There appears to be a very definite and quite extensive field for lime in the treatment of these manufacturing wastes. Wherever a neutralizing or precipitating agent is needed, lime is almost instinctively turned to as the logical substance to use.

Right at present there is a whole field of research open on this subject.

(1) Data is needed on the relative efficiency of lime and lime processes in comparison with other precipitants and processes.

(2) Economical and efficient processes are required for the treatment of the wastes of certain industries.

(3) The problems of sludge handling and sludge dewatering are in most cases bound up with hydrogen ion concentrations, and the use of lime in this connection needs to be studied.

And, finally, the whole trade waste situation needs to be studied from the standpoint of lime and lime processes, and these processes developed and gotten together in such form that they are attractive to both the engineer and manufacturer.

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Crushed Stone Rate Revision

A REVISION of rates on crushed stone, within ninety days from the service of the report, from Buffalo and Linwood, Ia., to destinations in Illinois, has been required by the Commission, in No. 14472, Dolese Brothers Co. et al. vs. Atchison, Topeka & Santa Fe et al, opinion No. 9473, 89 I. C. C. 110-24. The Commission found the rates from the Iowa quarries to destinations in Illinois unreasonable and unduly prejudicial. It determined what would be reasonable and non-prejudicial rates to key points and directed the railroads to work out rates to points on and west of the line of the Illinois Central, Freeport to Centralia, Ill., in accordance with the findings, within ninety days, reserving the right to the complainants to bring the matter to its attention again if the carriers did not comply. The report also covers No. 14450, Edward L. Scheidenhelm Co. vs. Chicago, Rock Island & Pacific et al. Reparation was awarded to Dolese Brothers Co., in both cases, because that company bore the charges.

The Commission said the rates from the Iowa quarries were unduly prejudicial against them and unduly preferential of competitors in the Chicago, Kankakee and Joliet districts and that the undue prejudice should be removed by the publication of the key rates and others worked out in line with such key rates. It said the use of a distance scale would be impossible because rates on crushed stone and gravel were made in Illinois, without much regard to distance, to enable a district on one railroad to compete with districts on other railroads and because, generally speaking, such rates in Illinois were on a lower level than those from one state to another.

The key rates determined by the Commission, the same as those proposed by the complainants, except to Bloomington and Springfield, are as follows: To Savanna, 80 cents; Freeport and Rockford, $1; Peoria and Galesburg, 88 cents; Bloomington, $1.13; Springfield, $1.26; Streator and Beardstown, $1.13; and Quincy, $1.26. The complainants asked for rates of $1.01 to Bloomington and Springfield.—*Traffic World.*

Foundry Sand Company Extends Operations

THE Great Lakes Distributing Co. of Detroit has purchased foundry bank sand properties located near Saginaw, Mich., covering 160 acres adjacent to the Pere Marquette Railroad. Engineers estimate there are in excess of 100,000 carloads of sand suitable for core making purposes. Equipment is being purchased to increase the present daily loading capacity of 42 cars.

Lightning Sets Off Explosives at Quarry; Seven Men Killed

WINSTON SALEM, N. C., June 24.—Seven men were instantly killed at a rock quarry six miles south of the city this afternoon when lightning struck a shed in which the men had taken refuge during a thunderstorm and in which was stored explosives.—*Chicago Tribune.*

Hints and Helps for Superintendents

A Bin for "Short and Over"

THE bin shown here stands by the scales of the Dixie Gravel Co., Chattanooga, Tenn., and is used in regulating the weight of loads that are delivered by truck. The trucks are loaded at the truck loading bins about a hundred yards away and the tonnage estimated by the eye. An experienced man can determine the weight of a load very closely, if he has loaded the truck before. After loading the trucks drive on the scales and if the order calls for a definite weight, as three tons or five tons, additions or subtractions are made to the load to bring it to the required amount. This is a very common method in other lines of industry but it is not much used in delivering sand and gravel and crushed stone.

The bin stands by the scale and the truck driver adds or subtracts to make his load exact weight

These "short and over" bins are made of concrete blocks and each bin will hold 3 to 4 cu. yd. There is one compartment for each size of sand and gravel that is usually delivered by truck.

Dinkey Experiences

By F. J. MacDonald, Cobleskill, N. Y.

IF I had had an idea of writing a series of articles about dinkey experiences I would begin by relating some every-day experiences with one of them.

It is an assured fact that millions of dollars are spent and lost every year by the careless use and abuse of machinery. This particular dinkey behaved most admirably until the last, showing its sturdy construction, and passed into non-use without serious damage or destruction of life, which was marvelous under the conditions.

This steam dinkey was used all winter the first year I was on the job and stored or stood in the coldest place in the quarry during the night. The throttle leaked and the night man had no end of trouble to keep things from freezing up during a very cold night.

Here is where I wish to emphasize the importance of a building or engine house to run dinkeys into during the night and for repairs. The amount of coal and kerosene for torches that can be saved will soon pay for a building of some sort, which makes it very convenient for repairs on a cold day.

I also strongly recommend a pit for engine repairs.

We decided that the throttle must be ground (as it leaked so bad that the night man would have to raise steam during the night to inject water). The blower and injector pipes would freeze and many gallons of kerosene were used for torches. To get at the throttle the dome cap had to be removed. This was some problem, as every ¾-in. nut was rusted fast. After twisting off one stud bolt (which had to be drilled out later) we took a good cold chisel and split each nut. It is well to remember that it is better to split the nuts than to twist off the stud bolts for nuts are easily procured.

Perhaps there are a few amateurs that do not know that the throttle to a locomotive is located in the steam dome of the boiler.

The throttle valve was somewhat pitted and grooved and it took some reseating to get it tight. It was a double-seated semi-balanced valve and both seats had to fit perfectly.

In replacing the dome cap all the nuts and threads were coated with flake graphite and oil. Such nuts can be removed many years later with very little effort.

The steam brakes had been removed from the dinkey by the master mechanic before I came on the job and the parts were scattered along the track. I did not approve of such a procedure, but as some of the parts were lost and broken I made no effort to replace them.

This dinkey was like an old automobile. It had been tinkered with but needed a good general overhauling, but could not be spared long enough. It was related to me that this dinkey ran away one time with nine loaded cars behind it—4½ yds. each. One of the eccentrics had been allowed to work loose and the set screws were stripped and fastened in with wires. At the time of the runaway, the brakes were off, the eccentric turned so the reverse would not hold; the engineer jumped and away it ran down over the old trestle, but no harm was done. The trestle was extremely poor. Just an ace from being a wrecked dinkey.

More props were placed, and as it was not considered safe to ride over, the engine was started over it and another man caught it on the other side.

A long time after that this same engine came down with nine loaded cars and stopped on a flat just before breaking over the down grade. It was discovered in time that the throttle would not open. Just a little farther meant another runaway, which would have meant a wrecked dinkey, as the trestle was several years older.

But still its usefulness was preserved. How nice the nuts came off the steam dome cap and we discovered that a pin had been lost out of the valve levers! It was found and replaced with a good cotter pin.

This repair was quickly done, allowing time for cooling and raising steam again. The loose eccentric mentioned had been threaded and fitted with two ¾-in. set screws, but the holes were worn and 1-in. screws were used for a time. The eccentric had been neglected so long that it continually gave us trouble. We finally had to use two 1⅛-in. set screws screwed extremely tight with a good socket and pipe wrench. I much prefer to have eccentrics set in their relative position at the factory and properly key-wayed and keyed to the axle. (I am sure the larger locomotives are keyed.) The proper leads and valve setting can be done in other places along the line.

Draining a Quarry with a Steam Jet

A STEAM jet, or injector, is not an economical pump, as it wastes most of the energy in the steam in heating the water. Where it is used to feed a boiler this does not matter, as all the heat is recovered. But for other uses it is a most uneconomical device as compared even with the direct acting steam pump.

However, there are circumstances under which it is allowable to use a steam jet and one of the allowable installations is shown in the accompanying picture, which was taken at the O'Neil Lime

Draining a quarry with a steam jet

Works quarry in Calera, Ala. The steam jet raises the water about 50 ft. from a sump hole filled by seepage. The steam comes from the boilers that supply the hoist that pulls the cars upan incline from the quarry and is only turned into the jet when the hoist is not working. A short period of "pumping" is all that is needed to empty the sump.

As the hoisting engineer looks after the jet and fires the boilers, there is no extra expense connected with the running of the jet but that of a little extra fuel, and as steam has to be kept up anyway this extra cost can hardly be figured, especially as coal is very cheap in that locality.

For such time as the hoist is not running and the boiler is cold, there is a 2-in. centrifugal pump and gas engine installed. The night watchman keeps the quarry dry with this so that there is no delay in starting work in the morning.

A Handy Shaft Hanger Kink

By W. F. Schaphorst

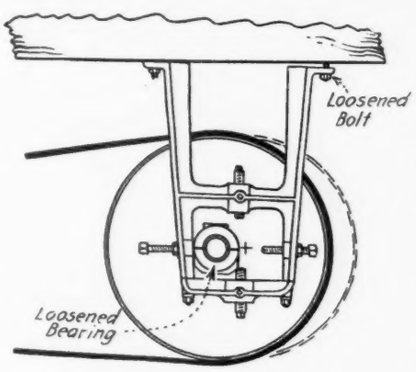
MILLWRIGHTS agree that it is bad practice to run a large belt onto a pulley by first forcing one of the edges to catch and then running the belt on either by hand or by power. It is well known that this is liable to cause the belt to stretch more on one side than on the other. The belt is thereby permanently injured. This holds true for belts of all kinds.

To avoid this condition we are often told to make leather belts endless while they are on the pulleys by means of belt clamps, etc., but that method may not always be practical and sometimes it is impossible, particularly if the belt has already been made endless by the manufacturers, as is often the case.

Where conditions allow it, a good kink for putting large belts onto the pulleys so as not to injure them is to loosen the adjusting screws on the hangers as shown in the sketch herewith. This permits the shaft to move over a considerable distance, temporarily shortening the distance between shaft centers. Sometimes the shaft may be moved inward 2 in. or even more, thus making it possible to put the belt on easily. Shortening the center distance 2 in. virtually adds 4 in. to the belt's length. To still further assist, one of the bolts for bolting the hanger to the overhead beam may be loosened so as to allow the hanger to swing inward still more. Where patented overhead beams are employed it is sometimes possible to slide the entire hanger forward without touching the adjusting screws. All of these methods are possible, yet they are seldom used because they are not thought of.

After the belt is on the pulleys the hanger may be brought back to its normal position. This is a simple thing to do by turning the nuts where the first and second methods mentioned above are employed. The original position of the hanger should always be marked before moving to avoid tedious relining. Turn the bearing adjusting screws back to their original position. These positions are easily found because the screw on the opposite side and the top screw need not be moved at all as indicated in the sketch.

In the sketch, which is drawn slightly exaggerate to emphasize these points, the



A handy shaft hanger

cross lines indicate where the center of the shaft will be after the beam bolt is retightened and after the adjusting screws are back to their original positions. The dotted curved lines show where the pulley rim will be after everything is retightened and back to normal.

This method, of course, is not always practical where there are belts running in both directions as on a common line shaft. But where it can be employed it is well worth while. It is a quick and simple method and the saving effected in large expensive belts surely makes it worth remembering and putting into practice.

Lighting the Quarry at Night

THE development of the incandescent light has made it possible to use search lights in many places where the old arc light could not have been used. The picture shows a handy form which can be carried easily from place to place. Several of these are in use at the Richardson slate quarry at Flex-Rite, Ga.

Portable light for quarry

In addition to these portable lamps stationary lamps of the same type are placed where they will illuminate parts of the quarry where work is going on all the time. With this system of fixed and portable lights the work can go on at night almost as easily as in the day time.

Lime Stucco

LIME stucco is the title of Bulletin 307A, recently issued by the National Lime Association, Washington, D. C. It is well illustrated and gives some handsome pictures of stucco buildings, most of them American and many dating back to Colonial times. Since lime stucco has been used for at least 3000 years, and in almost every country old and new, there are abundant examples from which to choose.

The remainder of the book treats of the technical side, the preparation of the stucco and its application; the use of color, etc. The book may be had on application to the National Lime Association.

Shope Concrete-Brick Patents Valid

D. F. Shope Wins United States Court Case and Will Recover Damages from Portland, Ore., Infringers of His Patent Rights

ROCK PRODUCTS producers will be interested in a patent case decided in the United States District Court at Portland, Ore., on May 27, 1924. The case involved the Shope process of making colored-faced concrete brick, which has been adopted by a number of sand and gravel and crushed-stone producers. The full text of the decision is given herewith:

Judge Bean's Decision

Ordered, Adjudged and Decreed as follows:

That Letters Patent No. 985,709, entitled, Method of Waterproofing Cement Blocks, granted and issued on the 28th day of February, 1911, to David F. Shope, and referred to in the Bill of Complaint herein, is good and valid as respects all of the specifications thereof.

That said David F. Shope was the first, true, sole and original inventor and discoverer of each and all of the claims mentioned and described in the said patent No. 985,709.

That the said inventions as described in said claims were new and useful inventions that were neither known nor used by others in this or any foreign country before the invention and discovery thereof by the said David F. Shope, and which were never patented or described in this or any foreign country before the invention and discovery thereof by the said David F. Shope, or more than two years before the application for the United States Letters Patent therefor, and at the time of the application for United States Letters Patent therefor, the same had not been in public use or on sale.

That before the infringements complained of in the Bill of Complaint, the Shope Brick Company, a corporation organized under and existing by virtue of the laws of the State of Oregon, had become and was and still is the sole owner of said Patent No. 985,709, as alleged in the Bill of Complaint, by assignment duly recorded in the patent office of the United States; that all of the inventions and improvements mentioned and described in the Patent No. 985,709 have been and are now used by the complainant and also by the defendants in the infringement complained of in said Bill of Complaint.

That said defendants Roy Ward and Otto Peterson, individually, and Roy Ward and Otto Peterson, copartners, doing business under the firm name and style of Ward & Peterson, copartners, infringed upon said Letters Patent No. 985,709, and upon the exclusive rights of the complainant under the same; that is to say, by making, using and selling blocks, bricks and artificial structures embodying the inventions and improvements patented as aforesaid and as charged in the Bill of Complaint.

And it is further ordered, adjudged and decreed that complainant does recover of the defendants, the profits, gains and advantages which the said defendants, or either of them, have received or made, or which have arisen or accrued to them, or either of them, in their individual or partnership capacity by the manufacture, use or sale of the said bricks or blocks or artificial structures, processed in the manner described in and in violation of the said Letters Patent, since the 1st day of January, 1923; and that the complainant does recover the damages resulting from said infringement.

And it is further ordered, adjudged and decreed that complainant does recover of the defendants its costs, charges and disbursements in this suit to be taxed.

And it is further ordered, adjudged and decreed that it be referred to Robert Maguire as Master in Chancery, his experience in such matters being found by the Court sufficient reason for such appointment, to ascertain, take and state, and report to the Court, an account of the number of bricks, blocks and artificial structures embodying the said inventions and improvements and each thereof, described and secured in said Letters Patent, made, used or sold by said defendants; and also the gains, profits and advantages which the said defendants have received or which have arisen or accrued to them, or either of them, since the 1st day of January, 1923, from infringing the said exclusive rights of said complainant by the manufacture, use or sale of the said inventions and improvements in the said Letters Patent, and the damages which the complainant has suffered by said infringements.

And it is further ordered, adjudged and decreed that the complainant, on such accounting, have the right to cause the examination of said defendants, or either of them, ore tenus, or otherwise; and also the production of the books, vouchers or documents of the said defendants; and that they and each of them attend for such purpose before the said Master in Chancery as the said Master shall direct.

And it is further ordered, adjudged and decreed that a perpetual injunction be issued in this suit against the said defendants and each of them, restraining them, their agents, clerks, servants, or all claiming by, through or under them, from making or selling, or in any way using or disposing of bricks, blocks or artificial structures, embracing the inventions or improvements described in said Letters Patent, pursuant to the prayer of the said Bill of Complaint.

And jurisdiction is hereby retained for the purpose of making and enforcing any additional order or orders as may be deemed necessary relative to this suit, and to enforce compliance to this decree.

Dated at Portland, Oregon, this 9th day of June, 1924.

(Signed) R. S. BEAN,
United States District Judge.

Other Infringement Cases

A previous decision, granting a permanent injunction, had been obtained from the United States District court at Phoenix, Ariz. A case in the United States court at Philadelphia, Penn., is still pending.

Harvey T. Gracely Wins Promotion

HARVEY T. Gracely, popular advertising manager of the Marion Steam Shovel Co., Marion, Ohio, has been promoted to be assistant sales manager. Mr. Gracely's experience in engineering work, his experience as owner and operator of Marion equipment and the last few years of sales and advertising work give him a background of contact and knowledge which fit him admirably for the work he is to undertake. He is also a director of

Harvey T. Gracely

the Manufacturers' Division of the National Crushed Stone Association.

Clarence E. Silva, formerly of the Engineering Department of the Marion Steam Shovel Co., has been promoted to the position of advertising manager to fill the vacancy left by Harvey T. Gracely.

Federal Government Opens a Rock Quarry in Missouri

THE federal government will do some revetment work along the bank of the Missouri river near Wainwright, Mo., and the 3600 ft. of dykes contemplated will cost in the neighborhood of $90,000.

A quarry to supply the necessary rocks has been opened on the Eliza Ewing farm near Algoa this week and a force of about 75 men will be put to work shortly. The necessary rock material will be blasted on the river bluff on the Ewing farm and will be taken on barges to Wainwright, six miles east from that point.—*Jefferson City (Mo.) Tribune.*

"Open Price Plan" of Cement Companies Declared Illegal in Missouri

Two Companies Fined and Attorney General Threatens to Sue Others

THE suit of the state of Missouri against two portland cement companies, for violation of the Missouri anti-trust law resulted in a fine of $10,000 each being paid by the companies. The case was afterwards taken to the state supreme court which upheld the action of the lower court both as to the fine and an ouster order which was issued but later stayed by the court. Attorney General Barrett has threatened to bring suit against other cement companies doing business in the state.

This is told in detail in a special dispatch to the *St. Louis Globe-Democrat* dated Jefferson City, June 10, as follows:

The Missouri Supreme Court today sustained Attorney General Jesse W. Barrett's ouster proceedings against the Ash Grove Portland Cement Co. and the Dewey Portland Cement Co., both of which have been doing business in Kansas City, for violations of the Missouri anti-trust laws. The court imposed a fine of $10,000 on each of the companies and ordered that they be ousted from the state, the ouster to be stayed, however, upon the condition that the two companies in the future refrain from illegal practices.

No testimony was taken in the case, the cement companies having determined to stand on a demurrer in which they claimed that the practices which they admitted to be as charged by the attorney general did not amount to a violation of the law. The Supreme court by unanimous vote sustained Attorney General Barrett's contention as to the law, but two of the court, Judges J. T. Blair and Ragland, dissented from the judgment of the court with respect to the penalty imposed.

"Open Price Plan"

The two cement companies named were members of the Norcross Audit and Statistical Bureau at Kansas City which was composed of some six or eight cement companies, the rest of which were not engaged in Missouri business. The Norcross bureau collected data from each of the members as to their stocks on hand, their selling prices, their volume of sales and other such information and distributed the information so collected to each of the members.

The entire procedure was an adaptation of the "open price plan," which has been developed in recent years by certain prominent corporation lawyers and which Attorney General Barrett assailed in 1921 as a violation of the Missouri anti-trust laws. He announced at that time that the "open price plan" was merely a subterfuge for evading the statute against price fixing; that the necessary effect of the exchange of such information between competitors was to increase prices and to make them uniform. He filed suit against the St. Louis Lumber Trade Exchange of St. Louis as a typical example of the open price plan and stated that similar suits would be filed against all other such combinations.

Upon his announcement of policy the cement companies composing the Norcross Bureau ceased the practices complained of and have not since renewed them. The lumber trust, however, continued in its activities and claimed that the attorney general was wrong in his view of the law. The Missouri supreme court last fall dissolved the lumber trust and awarded ouster and fines totaling $96,000, the highest fine on any individual company, however, being $10,000.

Attorney General Barrett gathered evidence of the action of the cement companies and transmitted it to the United States Department of Justice. Frequent conferences have been held between him and the special assistant United States attorney general, Roger Shale, in charge of the government cement prosecutions. As a result of these circumstances the government likewise sued the Kansas City cement companies and recently obtained an order in the federal court of Kansas City enjoining the companies from any further use of the open price plan.

Must Pay $20,000

The proceeding today concluded in the supreme court puts the cement companies under the two-fold orders of both the federal and state courts and collects for the state of Missouri the sum of $20,000 as a fine for the past offences.

Attorney General Barrett stated today that the cement companies on the eastern side of Missouri, including the Atlas Portland Cement Co. at Hannibal, the Missouri Portland Cement Co. and the Continental Portland Cement Co. of St. Louis, and the Cape Girardeau Portland Cement Co. had followed very similar practices in an association known as the Midwest Cement Credit and Statistical Bureau, the headquarters of which were at Chicago, and that suit would be filed against these companies also to put them under the same safeguard as to the future as the Kansas City companies and to recover for the state treasury an appropriate sum of money as fines.

Attorney General Barrett said today in commenting on the case, "Missouri leads every other state in the Union in successful anti-trust proceedings. It may be taken now as definitely settled that the Missouri statutes as applied by the Missouri supreme court do not permit the use of the so-called 'open price plan.' That device invented by lawyers like Eddy of Chicago and Hurley, former chairman of the Federal Trade Commission, has been heralded as a sort of 'co-operative competition' which did not violate any of the laws against combinations and trusts. As a matter of fact, its effect, if not its intent, was exactly the same as the old time price fixing agreements. I said at the outset of my term that Missouri's public policy demanded full and free competition and that no artificial restraints upon competition would be tolerated. The judicial condemnation of these devices has now been written into our court decision and a precedent has been sufficiently established to protect our people throughout the future."

Trustee for Monmouth Stone Company

LOCAL stockholders of the Monmouth Stone Co. have been informed that Attorney Charles E. Lauder of Monmouth has been appointed trustee for the bankrupt concern.

With the appointment of a trustee the term of Frederick Lauder as receiver for the bankrupt concern automatically ends. The receiver has had charge of the property since the officers of the company confessed insolvency and a complete inventory of the plant has been taken. This will be turned over to the trustee in bankruptcy forthwith.

Mr. Lauder was unable to predict just what disposition will be made of the plant. The holdings of the bondholders must be reckoned with, it being reported that the amount of the bonds is equal to the physical value of the plant.

It has been reported that a group of Iowa capitalists have been considering the purchase of the plant as it stands, their intention being to move it to Iowa for installation in a new stone quarry. Asked relative to the authenticity of the report Mr. Lauder stated that he knew nothing of it whatever. —*Galesburg (Ill.) Journal.*

Chinaman Killed in Canadian Cement Plant

BECOMING entangled in machinery, a Chinaman lost his life at the Bamberton (B. C.) plant of the B. C. Cement Co. recently. The man had been working around the machinery, helping a white employee on the night shift, just preparatory to leaving for the day.

The white employee left the scene to get some material and when he returned the Chinaman had disappeared. A few moments later his body was found in the machinery. It had been drawn in by the belting, it is presumed, though as the accident was not witnessed it is not known just how the tragedy took place.—*Victoria (B. C.) Times.*

More About the Missouri Experiment in Highway Material Contracts

Iowa Quarryman Relates Some of His Experiences with Mr. Piepmeier

THE EDITOR of ROCK PRODUCTS—It is superfluous for me to mention that I look over every one of your publications quite thoroughly. As we have had a number of meetings with Mr. Piepmeier and considerable correspondence on account of the work which the Missouri State Highway Commission is doing, we are reading the articles of Mr. Shaw with considerable interest.

In fact, we believe in the plan which you are following of keeping in close touch with the situation for the purpose of discouraging such state experiments as much as possible. Practically all of the experiences of business handling by municipal, state or federal officials have been very expensive, and we cannot conceive of the present conditions being any different than the past. By that we mean that in most all cases it requires an experienced private individual or corporation who has a real interest in making a success of the business; and, as is generally the case, men who are in public office may have ideas at different times that they are in a position to be able to produce different commodities at a lower price, it is very seldom that they are experienced enough in the business to take into consideration all of the difficulties which they are going to encounter, when they actually get to doing business.

When reading these articles the thought occurred to the writer that some of the ideas which were advanced by myself to Mr. Piepmeier in connection with the production of crushed stone might be of some interest to others, and for that reason I am writing you this letter.

We attempted to secure some business from the state of Missouri, and during our negotiations with Mr. Piepmeier he was trying to show us where we could make considerable money by opening up a plant or plants in Missouri. We wanted to ship materials directly from our plant at Davenport, Iowa, and tried to point out to him the advantage of doing so, instead of opening up plants in Missouri. Following are some of the thoughts expressed to him:

"We realize fully that you are anxious to have some responsible individual or firm operate a quarry at Gallatin, Mo., to produce a considerable tonnage and we also realize that when considering the production of crushed stone at Gallatin, you are using the figures of a very favorable originating point, considering the cost of transportation for the northwestern part of the state of Missouri.

"We have well considered the proposition of opening up a quarry in Missouri, and are obliged to inform you that we cannot figure any profits in such a proposition, and we will give you some of our conclusions as to why we consider such a move unsatisfactory as a business proposition.

"In connection with opening a quarry at Gallatin you must have in mind a satisfactory size plant, and the amount of material which the state of Missouri would be willing to purchase, and by taking these two points into consideration and the price which the state would be willing to pay, you then no doubt arrive, according to your figures at a net profit for such a plant from this production and sale of materials. But there is another point to be considered, and that is the percentage of different sizes which would be produced in operating the plant. This I will attempt to explain:

J. F. Schroeder

Can't Run Plant Profitably on Highway Stone Alone

"By taking our own cost of production per ton for the year of 1923 we are in a position to figure on every ton of material produced for the reason that we can grade our sizes for shipments to the State Highway Commission exactly according to their specifications and can dispose of whatever surplus we may have in this vicinity, on account of having six cities with a population of approximately 160,000. We have besides a highly developed and wealthy rural district in our shipping territory. We were, therefore, able in 1923 to sell all of our fines for agricultural purposes. So, by not being obliged to waste any materials our cost of production per ton must be lower than where a company is obliged to continually use a crane for unloading, and very possibly wasting from 10 to 20% of the material crushed.

"We have no way of knowing exactly how the material at Gallatin would grade as to size, and then again from experience it will also vary somewhat according to the conditions of the weather, but we are fully convinced that your Highway Commission could not safely allow your inspector at the plant to change the grading specifications whenever necessary to meet plant operating needs, so that all of the different sizes could be shipped steadily on highway work, besides having a large amount of fines to be taken care of daily.

"We know from experience that we have yet to find an operator whose material will come through the plant in such correct percentages of the different sizes as to exactly meet the specifications of the Highway Commission.

"Therefore, an operator would be confronted with the proposition of not only wasting the greater percentage of the fines, but also the surplus of the sizes of crushed stone which could not be taken daily on highway work. You can readily determine that by having an expense for the wasting of material besides losing a certain percentage of materials, which from our experience will run anywhere from 10 to 20% steadily, it will materially increase the cost of production of the stone you actually do have an immediate use for.

"We also have this experience at our quarry: When we have a large amount of business and are obliged to run steadily, even though the weather may not be exactly favorable, it sometimes happens in unfavorable weather that the stone is not always acceptable and we are then obliged to unload some material on what we call our off-grade pile, which we are always able to sell for macadam, and other driveway or road purposes.

"In fact, it is not possible to enumerate all of the difficulties and grief which are

encountered where a crushed-stone plant is located at a point away from markets for a large consumption of various sizes including fines outside of road material.

"It is our opinion, Mr. Piepmeier, that a quarry operator who has made a success of the business would arrive at the same conclusions that we have in connection with opening up a crushed-stone plant, which might be considered as a plant for the furnishing of road materials only.

As to Railway Ballast

"We have also had a conference with one of the higher officials of the Chicago, Rock Island & Pacific railway, who stated that they were very anxious to have a quarry opened on their line at Gallatin, but only for the purpose of securing a satisfactory amount of freight revenue, and not with the thought in mind of purchasing any materials to be used on their line, as this official stated that they at one time purchased considerable material at Gallatin, which has not proven satisfactory, and as far as they had determined at this time, they would not at any time in the future purchase any more Gallatin material for ballast.

"We also arrive at this conclusion that the officials of the Wabash line are only interested along the same lines as the Chicago, Rock Island & Pacific and that is with the thought in mind of securing freight revenue, and not for the purpose of any ballast.

"We believe from the foregoing, Mr. Piepmeier, that you will realize that we have given this a considerable amount of thought before definitely coming to the conclusion that we are not interested in opening up a quarry in Missouri.

"We further believe that it would be an advantage to purchase our materials which we produce at Linwood, as you no doubt are perfectly familiar with the quality of our material and agree with us that our material produced at Linwood is considerably superior to the Missouri material, and it would seem to the writer that instead of determining the purchasing of a minimum amount of material from our Linwood plant that you would attempt to purchase a maximum amount of material that you could possibly purchase, even though you are considering a delivered price per ton of material at destination, and using Gallatin as an originating point for comparison; which would be a very low figure on account of the low freight rates from Gallatin to destination point.

Cheapest Not Always the Most Economical

"You will fully understand that a ton or cubic yard of coarse aggregate will make a number of square yards of finished concrete. We could give you the exact figures on this, but we would prefer to have you make your own calculations. So taking into consideration, even though we use quite a wide variation, by considering an additional cost in your finished concrete paving of 8c and upwards per sq. yd. we arrive at this conclusion: That while to a private contractor who has no further interest in the paving beyond doing his work with accepted material and standard specifications and receiving his money it might mean a profit, by using the lower first-cost material, and our material might mean a loss to him; but considering this from what might be termed a consumers' point of view, there might be a considerable advantage in purchasing our material. On an 18-ft. roadway we have a total of 10,560 sq. yd. per mile and when you consider an additional cost of 8c per sq. yd. it means an additional cost of $844.80 per mile. But even considering a higher cost it would mean but a small percentage of increase when taking your present average cost of $29,000 per mile for the concrete paving alone. The superiority of the finished pavement might well justify a larger difference.

"The writer is not nearly so able to judge the merits of the different grades of materials in a finished concrete, and I am merely giving you these figures for your own fair consideration when you determine by using a poorer grade of coarse aggregate that you might have an additional cost of maintenance yearly, besides having a shorter life of the paving itself.

"In fact, it would not surprise me if the cost of maintenance alone would be enough to even up this additional cost when considering our materials.

"We trust that this letter has been so written as to cause no offense, as we have merely attempted to express our views along strictly business lines, and with the best of intentions."

LINWOOD CEMENT CO.,
By J. F. SCHROEDER, *General Manager.*
Davenport, Iowa, June 14, 1924.

Ray C. Haynes

Want Cheaper Rates on Agstone

AN ORDER reducing freight rates within Indiana on agricultural limestone is requested in a petition which the Indiana State Chamber of Commerce has filed with the public service commission. The petition asserts agricultural limestone can be shipped to Indiana points from Illinois and Ohio cheaper than it can be shipped to Indiana points from the quarries in Bedford, Greencastle, Spencer, Huntington and Logansport.

New Vermont Lime Plant

BREWER & CO., INC., with headquarters in Worcester, Mass., have commenced to construct a new lime plant near Winooski, Vt., which will have eight kilns, with a capacity of 250 tons a day each. One kiln is about half finished, and three others are in process of construction. One small kiln now in operation is producing about 35 tons of lime a day.

The new kilns will be operated mechanically, day and night, and will burn about a carload of soft coal a day. The company owns about 100 acres, and tests have shown that the lime stone deposit is from 150 to 200 feet in depth. Howard D. Brewer of Worcester is the principal owner.—*Boston Transcript.*

Sales Manager of the Universal Gypsum Company

RAY C. HAYNES is sales manager of the Universal Gypsum Co., Chicago, Ill. He was vice-president in charge of sales of the Acme Cement Plaster Co., St. Louis, Mo., until this company was sold to the Certainteed Products Co. Mr. Haynes is one of the best known and best loved men in the gypsum industry. For several years, until January, 1923, he was president of the Gypsum Industries Association—now the Gypsum Industries, Inc.

Wisconsin Lime Plant Burned

FIRE starting from an undetermined cause destroyed the lime kiln and stone crusher at High Cliff, Wis., owned by the Western Lime and Cement Co., June 8. The loss is estimated at $100,000.—*Zanesville (Wis.) Gazette.*

Texas Rates on Lime

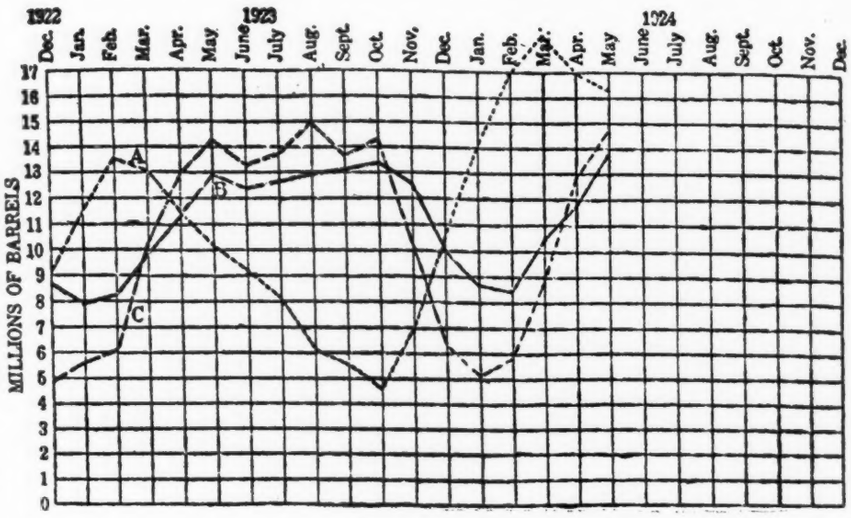
THE railroad commission has authorized the following rates on lime, carloads, minimum weight 40,000 lb. a car: From Austin, Dittlinger, McNeil and Round Rock to Beaumont and Orange, 19 cents, and to Atreco, Magpetco, Port Arthur, Port Neches, Sabine Pass, Smith's Bluff and West Port Arthur, 20½ cents a 100 lb.

Portland Cement Output in May, 1924

THE STATISTICS shown in the following tables issued by the Department of the Interior, and prepared under the direction of Ernest F. Burchard, of the Geological Survey, are based mainly on reports of producers of portland cement but in part on estimates. The estimates for May, 1924, were made necessary by the lack of returns from two plants.

The month recorded increases in both production and shipments, production exceeding that of any month so far recorded in the industry and the shipments exceeding those of any month—excepting August of the preceding year. Stocks decreased by the amount of excess of shipments over production but remained at high levels.

Stocks of clinker, or unground cement, at the mills at the end of May, 1924, amounted to about 8,219,000 bbl., compared with 8,545,000 bbl. (revised) at the beginning of the month.


1922
1923
1924
Dec. Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec. Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
MILLIONS OF BARRELS
17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
A
B
C

Portland cement production, stocks and shipments. (A) Stocks of finished portland cement at factories. (B) Production of finished portland cement. (C) Shipments of finished portland cement from factories

PRODUCTION, SHIPMENTS AND STOCKS OF FINISHED PORTLAND CEMENT, BY MONTHS, IN 1923 AND 1924, IN BARRELS

Month	Production 1923	Production 1924	Shipments 1923	Shipments 1924	Stocks at end of month 1923*	Stocks at end of month 1924
January	7,990,000	8,788,000	*5,628,000	5,210,000	11,477,000	*14,155,000
February	8,210,000	8,588,000	*6,090,000	5,933,000	13,596,000	*16,815,000
March	9,880,000	10,370,000	10,326,000	8,995,000	13,045,000	*18,189,000
First quarter	26,080,000	27,746,000	22,044,000	20,138,000		
April	11,359,000	11,726,000	12,954,000	12,771,000	11,463,000	*17,159,000
May	12,910,000	13,777,000	14,257,000	14,551,000	10,144,000	16,385,000
June	12,382,000		13,307,000		9,168,000	
Second quarter	36,651,000		40,518,000			
July	12,620,000		13,712,000		8,081,000	
August	12,967,000		14,971,000		6,080,000	
September	13,109,000		13,698,000		5,533,000	
Third quarter	38,696,000		42,381,000			
October	13,350,000		14,285,000		4,612,000	
November	12,603,000		10,251,000		6,991,000	
December	9,997,000		6,408,000		10,575,000	
Fourth quarter	35,950,000		30,944,000			
	137,377,000		135,887,000			

*Revised.

PRODUCTION, SHIPMENTS, AND STOCKS OF FINISHED PORTLAND CEMENT, BY DISTRICTS, IN MAY, 1923 AND 1924, AND STOCKS IN APRIL, 1924, IN BARRELS

Commercial district	Production—May 1923	Production—May 1924	Shipments—May 1923	Shipments—May 1924	Stocks at end of May 1923*	Stocks at end of May 1924	Stocks at end of April, 1924*
Eastern Pa., N. J. & Md.	3,347,000	3,463,000	3,782,000	3,690,000	3,342,000	4,165,000	4,392,000
New York	683,000	685,000	729,000	747,000	759,000	1,238,000	1,301,000
Ohio, Western Pa. & W. Va.	1,393,000	1,201,000	1,424,000	1,237,000	1,011,000	1,883,000	1,918,000
Michigan	722,000	877,000	806,000	1,010,000	549,000	755,000	888,000
Ill., Ind. & Ky.	1,965,000	1,960,000	2,511,000	2,133,000	755,000	2,528,000	2,701,000
Va., Tenn., Ala. & Ga.	643,000	985,000	672,000	996,000	208,000	744,000	755,000
E'n Mo., Ia. & Minn.	1,287,000	1,481,000	1,472,000	1,509,000	1,522,000	2,491,000	2,519,000
Western Mo., Neb., Kans. & Okla.	902,000	1,053,000	856,000	1,081,000	929,000	1,096,000	1,124,000
Texas	375,000	412,000	424,000	440,000	235,000	308,000	337,000
Colo. & Utah	288,000	267,000	274,000	279,000	178,000	183,000	196,000
California	977,000	1,069,000	977,000	1,106,000	136,000	382,000	418,000
Ore., Wash. & Mont.	328,000	324,000	330,000	323,000	520,000	612,000	610,000
	12,910,000	13,777,000	14,257,000	14,551,000	10,144,000	16,385,000	17,159,000

*Revised.

The Bureau of Foreign and Domestic Commerce, of the Department of Commerce, reports that the imports of hydraulic cement in April, 1924, amounted to 148,138 bbl., valued at $227,300. The total imports in 1923 amounted to 1,678,636 bbl., valued at $2,964,098.

The imports in April were from Belgium, 97,262 bbl.; Denmark, 23,764 bbl.; Norway, 17,765 bbl.; England, 4,456 bbl.; Sweden, 2,925 bbl.; other countries, 1,966 bbls. The imports were received in the following districts: Los Angeles, 62,648 bbl.; Porto Rico, 26,767 bbl.; New York, 18,022 bbl.; Philadelphia, 14,798 bbl.; New Orleans, 7,494 bbl.; Hawaii, 5,886 bbl.; Oregon, 4,927 bbl.; San Francisco, 3,050 bbl.; other districts, 4,546 bbl.

The exports of hydraulic cement in April, 1924, were 83,200 bbl., valued at $229,183, of which was sent to Cuba, 28,580 bbl.; to the other West Indies, 3,098 bbl.; South America, 21,337 bbl.; Mexico, 19,784 bbl.; Central America, 6,489 bbl.; Canada, 883 bbl.; and to other countries, 3,029 bbl. The total exports in 1923 amounted to 1,001,688 bbl., valued at $2,944,174.

IMPORTS AND EXPORTS OF HYDRAULIC CEMENT, BY MONTHS, IN 1923 AND 1924, IN BARRELS*

Month	Imports 1923	Imports 1924	Exports 1923	Exports 1924
January	71,686	153,732	70,169	88,586
February	20,529	162,930	88,531	62,606
March	66,521	160,517	98,861	91,224
April	76,899	148,138	85,662	83,200
May	88,480	(†)	103,630	(†)
June	111,559		77,203	
July	286,106		82,774	
August	324,008		73,201	
September	215,785		77,121	
October	172,051		74,302	
November	140,590		85,743	
December	104,422		80,487	
	1,678,636		1,001,688	

*Compiled from records of the Bureau of Foreign and Domestic Commerce.
†Imports and exports in May, 1924, not available.

Plans for Arizona Cement Plant Abandoned

LAST year representatives of the Riverside Portland Cement Co. of California, purchased a large tract a few miles east of Phoenix on the Southern Pacific railroad branch and limestone deposits near Winkleman, with intention of early erection of a large mill. It is understood that these plans were changed through a shifting of ownership of southern California mills, owned by a Los Angeles contractor and that no present prospect exists of their materialization.

Still another cement mill prospect is announced, but dependent upon the success of efforts now being made to finance the Paradise-Verde reclamation project, one that would need an enormous quantity of cement.—*El Paso (Tex.) Herald.*

Editorial Comment

Who Owns Open-Top Cars?

The National Sand and Gravel Association is making a determined fight to have coal shipments put on the same basis of demurrage and reconsignment privileges as shipments of sand and gravel and crushed stone. In this they are trying to benefit not only themselves but a great part of the rock products industry. The National Coal Association has taken exceptions to some of the sand and gravel men's published statements (especially a speech made by T. E. McGrath at the national convention of the sand and gravel industry.)

The coal men seem to believe that all open-top cars are built for no other purpose than to ship coal. To quote J. D. Battle, secretary of the National Coal Association:

"This industry has never done more than to ask that cars, primarily built and designed for handling coal, should be confined to that industry. Even with this statement we recognize that they may be useful and economically used for handling a great many other commodities and we do not intend to claim that the carrier hasn't the right to use them for loading other freight. But on the other hand it would not be proper to devote them to other industries when they were built primarily for a specific purpose."

T. R. Barrows, secretary of the National Sand and Gravel Association very properly takes exception to the attitude of the coal producers and replies to Mr. Battle as follows in an open letter, published in the *National Sand and Gravel Bulletin:*

"I should like to have you inform me as to the basis for your contention that open-top cars are coal cars and that their use for the transportation of sand and gravel constitutes an infringement on the coal industry. I seek in vain for anything in the act to regulate commerce, state regulations, railroad customs or established practices which says that one commodity and that commodity alone shall be transported in a certain type of railroad equipment. Are we to understand that every time a sand and gravel operator uses an open-top car, he is thereby granted a concession by the coal industry? Carrying out your contentions, which appear to me to be absurd, to a logical end, you are maintaining that the sand and gravel producer should be permitted to ship only when the coal industry has no immediate use for open-top equipment."

There can be no doubt that the position of the coal men *is* absurd, whether it is viewed from the standpoint of the other users of open-top cars, the railroads or the general public. Open-top cars are built to ship whatever the railways can get to haul in them. They represent an investment which at least must be made to earn interest and amortization charges. The only way this can be done is by keeping them moving with revenue freight. Misuse of its peculiar demurrage privileges by the coal industry has lost immense sums to the railroads by tying up equipment (in storing coal) that should have been out on the roads earning money by conveying shipments of crushed stone and sand and gravel. The general public (that it was intended should be benefited) has been actually held up by coal mine operators and speculators keeping loaded cars on sidings during a rising market to create a still greater shortage and further increase prices. But the public has also been no less robbed by preventing the railways from utilizing the earning power of their open-top equipment — thus providing legitimate causes for high operating costs and high freight rates.

Referred to Missouri

Rock Products would respectfully call the attention of the chief highway engineer of Missouri to the summary of prices paid for crushed stone by the Pennsylvania Highway Department. Approximately 900 bids were received so it is apparent that the department had plenty of choice and did not consider the prices at which contracts were awarded to be unreasonable. The prices at the quarry ranged between $1.55 and $1.60. The Kansas City producers, it is true, wanted 5 cents more a ton than the highest price, or $1.65, but when one knows the conditions of quarrying in the Kansas City district he is not surprised. We do not think that the Pennsylvania department would have characterized a price of $1.65 as "outrageous," and we are quite certain that it, or any other body of fair minded men would have considered the bid of $1.50 for crushed stone in large quantity to be very reasonable.

Oil Shale

It is understood that the President's commission, which is studying the best method of handling oil reserves, will recommend an experimental plant for treating oil shale. It would seem a good time for experimentation. Just at present crude oil is low. With oil it is always a feast or a famine and just now we are having a feast. But if the geologists know anything about it we have passed the high point in our production and the time is fast coming when we must look to other sources than oil wells for our liquid fuels. It would seem the part of wisdom to prepare for a shortage by just such experimental work as the government proposes. Rock products industries are not more interested in the production of oil *per se* than other industries which are considerable consumers of oil. But the development of the oil shale industry will open a field for our accumulated knowledge of the quarrying and handling of large quantities of rock, and if, as seems probable, spent shale will be used as far as possible in the making of portland cement, one of the major industries of the rock products field will be profoundly affected. Spent shale is already being made into cement in at least two European countries.

Eliminating "Shady" Contractors

Action by Government and Leading Associations

DIRECT action aiming at elimination of enormous losses now being sustained by the public through the presence of irresponsible contractors in the construction industry was taken when state highway officials, executives of leading bonding companies and officers of the Associated General Contractors of America met in Washington to give intensive consideration to present bonding practices on June 7.

Among those present were, representing surety companies: E. A. St. John, president of the National Surety Co.; A. M. Cook, vice president of the same company; E. W. Bush, engineer of the Aetna Casualty and Surety Co ; Richard Deming, vice president of the American Surety Co.; R. F. Proctor, vice president of the Maryland Casualty Co.; F. A. Bach, vice president of the Fidelity & Deposit Co.; Adney Hall, vice president of the United States Fidelity and Guarantee Co., and H. G. Bageron of the Continental Casualty Co. The contractors were represented by General Marshall, J. H. Cranford, president of the American Road Builders Association, Lloyd Brown, president of the Lakewood Engineering Co., H. H. Weston of Minneapolis, and H. H. Wilson and T. T. Waner. The State Highway officials included Fred R. White of Iowa, president of the American Association of State Highway Officials; W. R. Neel, chairman of the committee of that organization on co-operation with contractors; L. W. Bonlay, director of Highway and Public Works of Ohio; Frank R. Rogers, State Highway Commissioner of Michigan, and P. S. Wilson of the Bureau of Public Roads. The agents were represented by Arthur G. Howell of the National Association of Casualty and Surety Agents, Holcombe G. Johnson, W. G. Wilson and C. R. Lawrenson of Cleveland, Charles H. Burras of Chicago, and J. K. Livingston of Detroit.

Construction operation, both public and private, involving an annual expenditure of more than six billion dollars are now constantly subjected to hazards of default because of present promiscuous bonding, students of the situation declare. It is in an effort to drive irresponsible contractors from the field and thus place the entire industry in a position to function with greater economy and efficiency that the conference was called.

Secretary Hoover, shortly after Gen. R. C. Marshall of the Associated General Contractors called the meeting to order, told those present that since he had become head of the Department of Commerce more than 500 similar conferences had been held in the department. He spoke of the growing tendency on the part of industries to ask the government for assistance in solving their difficulties. Co-operation by organizations and by allied industries, he said, holds the only hope of keeping the United States an individualistic nation with the proper development of private initiative. He discussed business booms and depressions, showing how depressions can be best prevented by overcoming the boom period with their accompanying wastefulness.

Methods of surety companies in their investigations before underwriting were described as lacking an adequate system in many cases, and several speakers urged the establishment of a credit rating system. It was revealed that there is a committee of surety companies which is working toward a closer understanding as to the process of classification and ratings under such classifications but that this work is not necessarily a credit rating system alone.

Premium rates on bonds have increased more than 1000% in 20 years as a result of losses incurred because bonds have been issued carelessly by agents of the surety companies to individuals who become "contractors" overnight, according to statistics which will be presented to the conference.

In addition to shouldering the cost of these increased premiums, the public pays heavily, both as a collective body of taxpayers and as individual builders, when icompetent "fly-by-night" contractors who should not receive bonds throw additional costs upon construction through their inability to continue operations.

The action taken included a resolution favoring the elimination of the bid bond on contracts and the sureties consent. Discussion of this brought out a sentiment in favor of the use of securities like liberty bonds.

Another action taken was adoption of a resolution that all contractors should furnish full and accurate information at the time of making application for surety bonds both as to their financial standing, experience and contingent liability from work on hand, and that none of this information should be more than six months old. Discussion of this showed an agreement that in the bonding of a contractor, experience should be the most important factor, and that the next should be his equipment, its amount and condition, while the third should be the financial condition.

An important contribution to the discussion was information given by state highway officials as to the contractors who bid for work in their various states.

A further action was to refer to a committee of three to be appointed by the chairman the improvement of methods of ascertaining credit information, the committee being charged with working out a better method than now obtains.

Another committee of three was ordered by the meeting to survey the present practice of surety companies giving free service in engineering information and estimates. Discussion of this brought out a wide variance of opinion as to the value of present practices in this direction.

Further discussion was given to the practice of certain agents in splitting commissions with the contractor. This was denounced by representatives of the agents organization as hampering the efficiency of a large body of men who are giving honest service to both their companies and their clients.

The meeting referred to committees problems of other forms of securities, uniform enforcement of the time penalty and the publication of the name of surety companies on each security bond.

It was decided that these committees would have had time to complete their studies to a point where a report might be made at a meeting to be held late in September.

New Arizona Gypsum Plant

THE Gypsum Products Co. of Phoenix, Ariz., has awarded a contract to the Mine and Smelter Equipment Co., of that city, for the construction of a plant and gypsum mill at Sixteenth street and the Arizona Eastern tracks. The Gypsum Products Co. is a new one in the city and is headed by Gilmore Goodland of Morristown and Phoenix. The company's gypsum deposits are located near Winkleman, Ariz. The warehouse will be the first of its kind in Phoenix and will be constructed of ready cut steel units, known in building circles as "Stefco" ready-built steel buildings.—*Phoenix (Ariz.) Builder and Contractor.*

Celite Installs 125-Foot Kiln

AN unusually long kiln, for the calcining of diatomite, was recently shipped to the Celite Products Co., Lompoc, Calif., after manufacture and assembly at the plant of the Llewellyn Iron Works, Los Angeles. It was 125 ft. long by 9 ft. diameter, of ¾-in. plate, and was transported on two railroad cars, with a spacer in between. A running schedule of only eight miles per hour was arranged, to obviate accident as a result of the length of the load and to prevent overheating of the car bearings. The total weight, exclusive of caboose and locomotive, was more than half a million pounds, the kiln itself weighing 101 tons.

Cost of Crushed Stone for Building Pennsylvania Highways

IN its department, Business Side of Construction, the *Engineering News-Record* gives the following summary of the prices paid in Pennsylvania for crushed stone used on state highways:

The cost per ton of crushed stone in Pennsylvania state highway construction is shown in the following tabulation of lettings during the first quarter of the current year.

CRUSHED STONE AWARDS—PENNSYLVANIA HIGHWAY DEPARTMENT

Name of Contractor	Tons	Price per ton, f.o.b. Destination	Quarry	Road	Total Cost
Booth and Flinn Co., Pittsburgh, Pa.	1,000	.....	$1.60	.....	$ 1,600
Casparis Stone Co., Columbus, Ohio	1,300	.....	1.55	.....	2,015
Geo. M. Bushey & Sons, Cavetown, Md.	5,574	$2.00	.....	.....	11,148
	8,361	2.10	.....	.....	17,558
Epley Building and Supply Co., York, Pa.	3,220	.....	.....	$2.60	8,372
	6,600	.....	.....	2.35	15,510
General Crushed Stone Co., Easton, Pa.	4,250	2.05	.....	.....	8,712
	4,508	2.35	.....	.....	10,593
	4,500	.....	.....	2.55	11,475
Herbert L. Gingell, Fairfield, Pa.	7,720	.....	.....	2.50	19,300
Highway Stone and Service Co., Blue Ball, Pa.	3,400	.....	.....	2.35	7,990
	4,000	.....	.....	2.25	9,000
Clyde B. Johns, Malvern, Pa.	3,300	.....	.....	2.60	8,580
	4,560	.....	.....	1.65	7,524
National Limestone Co., Naginey, Pa.	10,000	.....	.....	3.00	30,000
	8,000	.....	.....	3.25	26,000
J. C. Showalter, New Holland, Pa.	17,700	.....	.....	1.90	33,630
Chas. Warner Co., Philadelphia, Pa.	6,000	.....	.....	2.90	17,400
Winston and Co., Harrisburg, Pa.	14,610	2.45	.....	.....	35,794

Approximately 900 bids were received by the highway department for crushed stone f.o.b. quarry and also delivered at 238 different points throughout the state. Out of the 900 bids, a total of 32 firms were awarded contracts in 29 counties.

The price at quarry ranged between $1.55 and $1.60; the minimum price at destination was $1.80, with the maximum at $3.15; f.o.b. road, the quotations were $1.65 to $3.35 per ton.

The three largest items were 14,610 tons at $2.45 per ton, f.o.b. destination, awarded to Winston & Co., Harrisburg, Pa., total, $35,794; 17700 tons at $1.90 per ton, f.o.b. road, awarded to J. C. Showalter, New Holland, Pa., $33,630; and 10,000 tons at $3 per ton f.o.b. road, to the National Limestone Co., Naginey Pa., $30,000.

In the accompanying table only the heaviest tonnages are shown at the respective f.o.b. points.

Tariff Commission Asked to Investigate Cement Dumping

THE domestic cement industry is greatly concerned over the dumping of European cement in this country, and there is strong pressure for the ordering of an investigation under Section 316 of the Tariff law. One of the factors which has delayed any action as yet is the lack of funds to undertake a comprehensive investigation of the character which would be required.

The cement application was filed by the Signal Mountain Portland Cement Co. of Chattanooga, Tenn. The same issues are involved as are being considered in a dumping investigation now in progress in the customs bureau of the Treasury Department. The applicant in the Tariff Commission case represents the view of cement manufacturers of the Southeastern section of the United States, who claim a serious injury by reason of the fact that cement from Norway, Sweden, Belgium and Denmark is being brought in at south Atlantic and Gulf ports at prices below American cost of production. The same situation exists on the Pacific coast, where cement manufacturers are facing competition from European cement which comes through the Panama Canal. The Pacific coast manufacturers have presented their case before the Treasury, and have not as yet filed an application before the Tariff Commission.

If the Tariff Commission orders an investigation of unfair trade practices in the importation of cement it will probably be necessary to send investigators to several countries in Europe as well as to plants of the domestic industry.

The cement case is now being considered by a sub-committee of the Tariff Commission and it is expected that an investigation will be ordered if sufficient funds are in sight to go through with it. —*New York Commercial*

Fire Destroys New York State Stone Plant

THE Akron, N. Y., plant of the General Crushed Stone Co., of Easton, Penn., was struck by lightning and largely destroyed by subsequent fire on June 21. The storm occurred about noon and was one of the worst on record. The Akron and Clarence fire departments responded, but were able to save very little.

A Use for Fine White Sand

EVERYONE who drives between Eldora, Iowa, and Steamboat Rock has seen the little shack of the Eldorado Sand Co. with the cable way running to the bottom of the hill but only a few have known that the fine white sand quarried here has for the last four years been used by James Beach & Sons of Dubueque, the largest soap makers in Iowa, in preference to any other grit in the manufacture of a very efficient scouring powder.—*Eldora (Iowa) Herald.*

Cement Plant Shuts Down to Replace Wooden with Concrete Dam

THE Lehigh Portland Cement Co.'s wooden diversion dam on Sullivan creek, about five miles above Metaline Falls, Wash., will be replaced with a concrete structure at a cost of about $35,000 this summer, according to announcement made by W. G. Perrow, district manager of the company.

About 50 men will be employed and the construction work is expected to be complete before fall. The work will be started in July.

The cement mill was closed recently and probably will not reopen until September 1.

About 75 of the 100 men employed at the mill have been retained for the work of dismantling a saw mill that was used in cutting lumber for the construction of a flume and the wooden dam.

As soon as the saw mill is dismantled the construction of the dam will be started. —*Spokane (Wash.) Chronicle.*

Cement Companies Sued for Accidents to Employes

BELOW are two newspaper items which come to our desk. We reproduce them not without realizing that such publicity may be unkind to the concerns mentioned, but with a belief that such publicity will materially help the cause of accident prevention.—The Editors.

CLAIMING that the defendant company unlawfully employed his son, who was less than 14 years old, in its cement plant, Arthur McAfee filed suit for $20,000 damages against the Phoenix Portland Cement Co. of Birmingham, Ala.

The bill of complaint charged that, after illegally employing the plaintiff's minor son, the cement company required or permitted him to work in a dangerous place with the result that one of his hands was crushed so seriously that his earning capacity will be permanently impaired.—*Birmingham Age-Herald.*

SAMUEL T. WOOD, administrator of the estate of Roy T. Wood, deceased, is suing the Atlas Portland Cement Co. for $10,000 on account of the death of Roy T. Wood, who was killed in an accident in the Clinker mill of plant No. 6 on the 14th day of September, 1923, when his clothing is alleged to have caught in a belt and the young man received injuries which resulted in almost instant death. The plaintiff in the suit alleges in his petition that the machinery was not properly protected. The defendant company denies this and declares that R. T. Wood was guilty of contributory negligence and that the estate is not entitled to recover.—*Hannibal (Mo.) Post.*

Claims Sand Pits Cut Building Costs

EFFORTS are being made to have the sand pits and concrete block plants moved away from Flatbush, L. I. The district has been built up since the plants were erected. An injunction has been asked for by the owners of residence property. Discussing this, George Egbert, Jr., speaking for the Concrete Products Manufacturers Association, says, according to the New York American:

"In Brooklyn and Queens builders and contractors are all up in arms, as they realize the difference in the cost of construction which the closing of this East Flatbush industry would cause.

"About one-third of all construction in the borough is of cement and concrete, and the cost of this will be doubled if the industry is moved. Transportation is one of the biggest factors in determining the cost of cement and concrete blocks, and the cost of hauling blocks, cement and sand into the district would be a big item.

"Competition would be eliminated, and this would add further to the building costs. The manufacture of concrete blocks is always a local one, and the plants move as the district develops to a residential section. This is history in the construction business.

"Most of the factories have been in operation several years, many dating back to 1910, and the residences have been built since this time."

It is estimated that 1,000,000 concrete blocks a day are turned out in this locality, all aiding cheap construction of dwelling houses.

Los Angeles Gravel Company Sues City and Is Itself Sued

HEARING on legal points in three suits involving the right of the city to enjoin the Los Angeles Rock and Gravel Co. from excavating sand and gravel in the bed of the Arroyo Seco near Avenue 26 was begun recently.

The rock and gravel company is plaintiff in two of the actions, while the city and people are plaintiffs in the other suit.

In its petition the city asserted the excavating of the stream bed constituted a menace to the health and property of the residents of the community bordering on the Arroyo Seco. The city also contended the excavating should be stopped as a means of guarding against a possible flood menace.

The company answered that the city itself was engaged in excavating in the same stream bed and that an injunction against the company would unduly deprive it of its constitutional rights and *give the city a monopoly of the business.*

The company also asked that the city be enjoined from enforcing two ordinances passed by the City Council, one making it unlawful to excavate below the level of an abutting street, the other making it unlawful to excavate in a residence district.

The company further asserted the possibility of a flood menace was precluded by the erection of Devil's Gate Dam and a retaining wall built by the company around its holdings.—*Los Angeles Times.*

New California Rock and Gravel Plant Begins Operations

THE California Rock Co., the new concern recently organized by well known Niles men, began work this week on its plant at Elliott, near Pleasanton, Calif.

The company will enter the field of taking sand and gravel from a large tract of land it has bought there for building material, which finds a ready sale throughout the Pacific coast.

Lee Frontz, one of the biggest stockholders, is the manager, and will be in active charge of all work at the plant. It will be completed and in operation in about three months.—*Centerville (Calif.) News.*

River Shipments of Sand and Gravel in Pittsburgh District

LARGE shipments of sand and gravel down the Allegheny, the Monongahela and the Ohio rivers are being distributed at south, southwestern and western points for the construction of public roads and highways.

In May, 352,283 short tons of sand were reported shipped, with 294,919 short tons of gravel, a total of 647,202 tons. In detail the three rivers carried the following tonnage:

Sand, Allegheny river, 108,155 short tons; Monongahela river, 90,263 short tons, and the Ohio river, 153,873 short tons.

Gravel, Allegheny river, 105,442; Monongahela, 80,800; Ohio river, 108,677.

New Lexington Sand Company Leases Land

THE New Lexington (Ohio) Sand Co. has leased the Kennedy farm north of town. from which they will ship sand. This sand has been given a complete test and it has been found to be fine for molding purposes. There are 126 acres in the farm.

The company will spend several thousand dollars in building a railroad to the farm, steam shovel, etc. It has not yet been decided if the spur will connect with the T. & O. C. or Pennsylvania railroad.

The head office of the company is at New Lexington.—*Bremen (Ohio) Derrick.*

Big New Cement Plant for Virginia

THE South Norfolk (Virginia) plant of the Virginia Portland Cement Co., the local subsidiary of the International Cement Corp. of New York, will involve a cash outlay of about $1,500,000, H. Struckmann, president of the latter company, announced recently in a letter to President T. P. Thompson of the Chamber of Commerce.

"Our engineers are working on the specifications and drawings for the new plant now," wrote Mr. Struckmann, "which we estimate will involve a cash outlay of $1,500,000. The erection of the laboratory and mill office building will be started within the next few weeks, and work on the plant proper will be under way within 90 days."

Baxter D. McClain, secretary of the International Cement Corp., who has been in Norfolk opening up the company's offices and superintending initial operations, declared recently that it was the intention of the company to erect what will be substantially a new mill on the property between the Belt Line and the Elizabeth river opposite the extension of Ohio street and South Norfolk. This property was formerly owned and operated by the Giant Portland Cement Co. and was purchased recently by the new owners.

With the exception of one or two pieces of machinery which can be utilized, Mr. McClain said the plans which the engineers were preparing would call for new buildings and new equipment throughout.

"This will enable the Virginia Portland Cement Co. to use the same methods of manufacture of cement used in the Houston, Texas, plant," said Mr. McClain. "There the raw materials are similar to those found in this vicinity." (Oyster shells and clay are used at the Houston plant.)

United States Gypsum Company Has Large Share of Ohio Hydrate Business

ADDITIONS, costing $300,000, to the lime plant of the United States Gypsum Co. near Genoa, Ohio, are completed and the new unit went into operation on June 20. This expansion makes this the largest hydrated finishing lime plant under one roof in the world.

This new construction, which has been in progress since last December, increases the number of kilns from 27 to 40. It makes the plant's daily production capacity 500 tons of hydrate a day. The gypsum company purchased property here in 1915 and erected nine kilns.

By the following year the demand for its products was so large that eight more kilns were added. Five more were built in 1919 and another five in 1923. This, the fourth expansion, includes not only new kilns of the most modern type, but also a new Schaffer hydrator and new quarry, mill, power and transportation equipment.

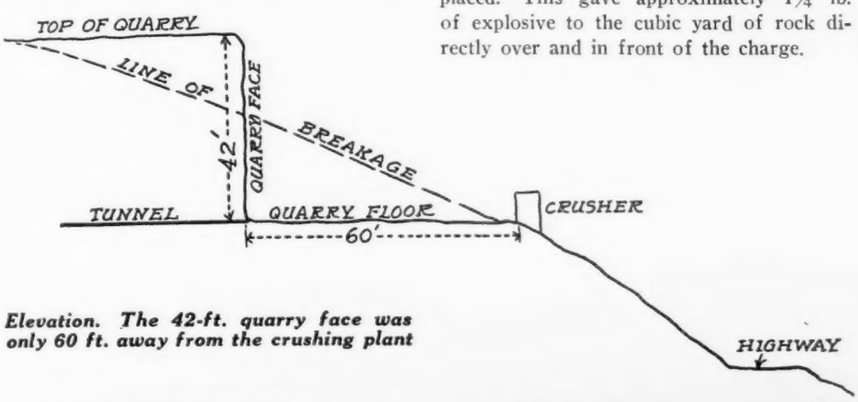
Blasting in Close Quarters

Good Judgment Keeps Shot from Injuring Crushing Plant and Highway

By A. E. Riley

E. I. du Pont de Nemours & Co., Wilmington, Del.

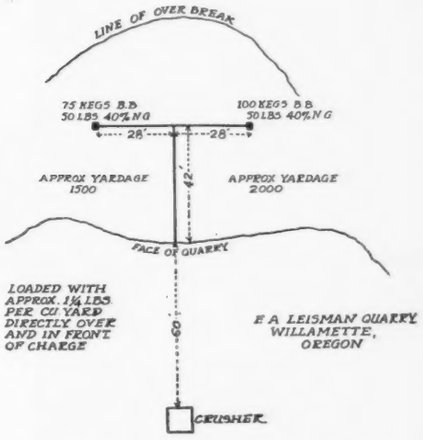
THE quarry of E. A. Leisman at Willamette, Ore., was recently the scene of a very pretty piece of blasting. The crusher plant is located at the top of a slope directly in front of the face of the quarry at a distance of only 60 ft. from the face. At the foot of the slope runs the highway. The rock is of the blocky boulder formation which is inclined to roll when explosives tear it loose from its place; nevertheless between 15,000 and 20,000 yd. were brought down from the 42-ft. quarry face without the slightest damage to the crusher and without throwing any rock on the highway. The secret of this achievement lay, of course, in the careful placing and accurate gauging of the charge.



Elevation. The 42-ft. quarry face was only 60 ft. away from the crushing plant

A tunnel was driven straight into the face, on a line with the crushing plant to a depth of 42 ft., and right angled crosscuts were carried in each direction to a depth of 28 ft. At the end of the left wing a charge of 75 kegs of B blasting powder and 50 lb. of 40% straight dynamite, and at the end of the right wing a charge of 100 kegs of blasting powder and 50 lb. of straight dynamite were placed. This gave approximately 1¼ lb. of explosive to the cubic yard of rock directly over and in front of the charge.

When the shot was fired, the face was well broken up and thrown down to the quarry floor between the face and the crusher, and there was a back-break which will yield considerably more than the yardage directly in front of and above the wings of the tunnel. How close the rock came to the crusher is shown in the accompanying photographs.



Plan showing tunnels and powder charges

View of crushing plant from the quarry taken after the shot had been fired

This shows how near the broken rock came to the crushing plant which is just outside the picture, at the right

To make explosives blast down rock into exactly the position desired without wrecking nearby structures requires skill in their use. The fine results in this case were due to the good judgment of John A. Krafsic of Portland, Ore.

Alabama Gravel Takes Same Rate as Sand

THE Alabama Public Service Commission in a decision made June 10 reduced the rates on gravel from Demopolis to Livingston, Cuba, Hixon and McConnell over the Alabama Great Southern railroad, placing the gravel rate on the same basis as rates on sand.—*Montgomery (Ala.) Journal.*

Pacific Portland Cement Company Buys Imperial Valley Gypsum Property

Second Big Gypsum Plant to Be Built by This Organization

SALE of the entire properties of the Imperial Gypsum Co. to the Pacific Portland Cement Co., Consolidated, of San Francisco was made known recently by the filing of deed for record.

The property of the Imperial Gypsum Co. consists of several hundred acres of gypsum claims in the foothills 25 miles northwest of Dixieland, Calif. The company was formed several years ago by San Diego and Imperial Valley residents and the stock has largely been held by them.

The property transferred included, besides the gypsum claims, a 27-mile narrow gage railroad connecting the mines with the San Diego & Arizona railway at the Campo station, where the gypsum company maintains a crushing plant and shops. Officials of the company owning the gypsum property have let it be known that they expected to spend $1,000,000 immediately in developing the mines to full capacity. A large plaster plant is also planned to be built at Campo.

The Imperial Valley Gypsum and Oil Co. built from the Campo station out to the deposit, which is possibly the largest single deposit of gypsum in the world.

The mine (or quarry in this case) is now equipped with an Armstrong all-steel well-hole drill using a 6-in. drill point, a Marion 40-ton steam shovel, two 40-ton Porter steam locomotives and a number of 30-ton cars, of the three 10-ton dumping skip type.

Blasting is done by shooting several holes 36-ft. deep in one shot, bringing down about 4000 tons of rock per blast. The explosive used is Phorphery special Hercules powder,

Remarkable gypsum deposit in the Imperial Valley, California, just purchased by the Pacific Portland Cement Co., Consolidated

The new company purchasing the gypsum deposits is said to be composed of San Diego and San Francisco capitalists with ample backing to develop the property upon a profitable basis. The gypsum company is known to have experienced difficulties in financing development and recently temporarily discontinued operations until a reorganization of the company's affairs could be effected.

The purchase price shown in the deeds delivered by the gypsum company to the Pacific Portland Cement Co., Consolidated, was $700,000.

has had an interesting history. The deposit was discovered a number of years ago by two men ,one of whom was county surveyor of Imperial County, California, for years. It was patented by them and retained year after year by hard work and much sacrifice. They never lost faith that some day it would prove valuable.

It was not until the recent completion of the San Diego & Arizona railroad, however, that the gypsum deposit was sufficiently accessible to have commercial importance. After the completion of this railway two or three years ago, a narrow-gage line was

which is said to be about equal to 40% nitroglycerine dynamite but slower in action.

The crushed rock is transported in train loads over the 27-mile narrow-gage railway to the crushing plant at Campo on the San Diego & Arizona railroad. The skip cars are here dumped by a Northern Engineering Co. electric hoist. The crushing plant is equipped with a 28x36-in. Ehrsam jaw crusher and two Ehrsam pot crushers, which reduce the rock to 1 in. or less.

The plant is equipped with a dust-collecting system discharging into a bin where 8 to 10 tons of agricultural gypsum dust

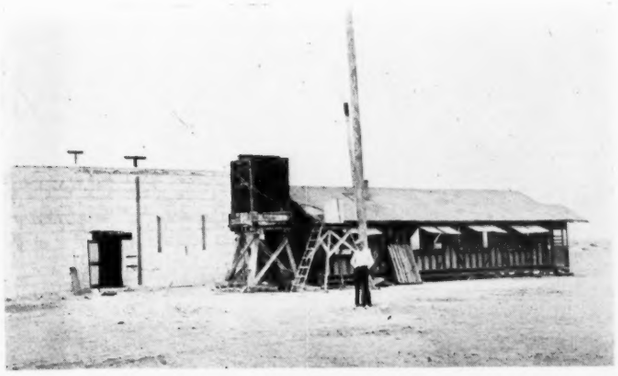
is collected daily.

Shipments so far have consisted of crushed rock to San Diego and Los Angeles plaster mills and dust for agricultural purposes. Plans have long been under way for a gypsum calcining plant at Campo.

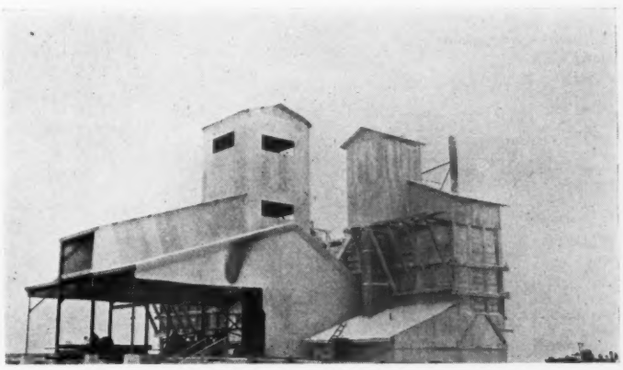
Incidentally the site of the crushing plant is one of the hottest (the temperature is 115 to 120 deg. F.) and dryest parts of the world. To keep men at work there requires a one-ton a day ice plant and a water-softening plant for boiler water, etc. The water used comes from the irrigation ditches of the Imperial Valley.

About 40 men are employed, 10 of whom work in the quarry. They go back and forth every day. Houses built of gypsum block are provided for them. All the water for use at the quarry has to be transported by rail. Oil fuel is used for power in the quarry, electric power is available at Campo.

The officers of the Imperial Valley Gypsum and Oil Co. are P. W. H. Cooms, banker of Bakersfield, Calif.; secretary, Hal Hotchkiss, San Diego; vice-presidents, J. Stanley La Sha, San Diego, and A. J. Curtis, Bakersfield; treasurer, H. A. Peterson, Maricopa.



Ice plant and eating place at Campo



General view of crushing plant

Pumping plant and tank at Campo

Another view of crushing plant and storage bins

The Pacific Portland Cement Co., Consolidated, has recently completed a big new gypsum plant at Gerlach, Nev., which will be described in detail in an early issue of Rock Products.

Gravel and Sand Rates Attacked

A PETITION was filed with the Alabama Public Service Commission recently by the Florence Chamber of Commerce attacking rates on sand and gravel from Montgomery, Jacksons Lake, Prattville Junction, Coosada, Oktamulke and Prattville, to Florence, Sheffield and Tuscumbia. The case was set for hearing July 11, at Florence. The Alabama Great Southern, Louisville and Nashville, Southern, Northern Alabama and Mobile and Ohio railroads are defendants in the case.

Coyote Hole Shot in Texas Trap Rock Quarry

FORTY thousand tons of columnar basalt, hard rock, came tumbling down from the face of a 100-foot cliff at Knippa, in Uvalde County on the S. P. Railway, on the Texas Trap Rock Co. property, when the officials needed to secure more material for their crushing plant. The basalt, when crushed, is used for street and road paving at Laredo. The blast was very successful, according to Arthur Muir, general manager of the Texas Trap Rock Co.

The face of the cliff of basalt where the explosion shook down the great mass of stone, is 100 feet high and almost perpendicular.

In the center of the space to be dislodged, on a floor level, a tunnel was extended into the face of the cliff for a distance of 40 feet, and from that point was extended a distance of 50 feet to either side, parallel with the face of the cliff. In these side laterals four tons of dynamite were placed in six pockets. Once the dynamite was placed, all the tunnels were packed full of stone and dirt, laid in layers, and well forced in. Detonation was secured through a fuse of T. N. T., touched off by electricity.—*San Antonio (Tex.) Express.*

Alabama Cement Plants Operating at Top Speed

ALL CEMENT plants in Alabama are operating at maximum capacity, with orders ahead to insure this basis of production for some time to come. The Lehigh Portland Cement Co. is setting up its fourth kiln and unit at the new works in the vicinity of Birmingham and plans to place the extension in operation at the earliest possible date. The Atlas Portland Cement Co. is active at its Leeds Works, near Birmingham, and will soon complete a new bag factory there. Each of these mills has a rated output of close to 1,500,000 bbl. per annum.—*Chemical and Metallurgical Engineering.*

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Blakeslee, N. Y.	1.00	1.40	1.40	1.30	1.30	.....
Buffalo, N. Y.			1.30 per net ton all sizes			
Cobleskill, N. Y.	1.25	1.25	1.25	1.25	1.25	.....
Coldwater, N. Y.			1.50 per net ton all sizes			
Eastern Pennsylvania	1.35	1.35	1.45	1.35	1.35	1.35
Munns, N. Y.	1.00	1.40	1.40	1.30	1.40	.....
Northern New Jersey	1.50	1.50	.....	1.50	1.50	1.40
Prospect, N. Y.	1.00	1.40	1.40	1.25	1.25	.....
Walford, Pa.	.....	.....	.....	.....	1.60b	.....
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL						
Alton, Ill.	1.50	.....	1.50	1.35	.....	.....
Buffalo, Iowa	.80	.....	1.25	1.05	1.10	1.10
Cypress, Ill.	.....	1.20	1.20	1.20	1.20	.....
Dundas, Ont.	.90	1.10	1.10	1.05	1.00	1.00
Gary, Ill.	1.10	1.40	1.10	1.10	1.10	1.10
Greencastle, Ind.	1.25	1.25	1.15	1.05	1.05	1.05
Lannon, Wis.	.80	1.00	1.00	.95	.95	.95
Northern Wisconsin	.50@1.75	.....	1.00	.90	.90	.....
River Rouge, Mich.	1.00	1.00	1.00	1.00	1.00	1.00
St. Vincent de Paul, P. Q.	.75	1.25@1.45	1.10	1.00	1.00	1.00
Sheboygan, Wis.	1.00	1.10	1.10	1.10	1.10	.....
Stone City, Iowa	.75	.....	1.40	1.30	1.25	.....
Toronto, Canada	1.90‡	2.25‡	2.25‡	2.25‡	2.00‡	2.00‡
Waukesha, Wis.	1.15	1.15	1.15	1.15	1.15	1.15
Youngstown, Ohio	.....	.....	1.30	1.55	1.55	1.55
SOUTHERN:						
Alderson, W. Va.	.75	1.75	1.75	1.60	1.50	.....
Bridgeport and Chico, Texas	1.00@1.25	1.50@1.60	1.30@1.40	1.25@1.35	1.25@1.35	1.25@1.30
Cartersville, Ga.	1.75	1.50	1.50	1.00	1.00	1.00
El Paso, Texas	1.00	1.00	1.00	1.00	.....	.....
Graystone, Ala.			Crusher run with fines out, 1.00 per net ton			
Graysville, Ga.	1.00	1.25	.....	.85@1.00	.85@1.00	.....
Russellville, Ala.	1.25	1.25§	1.50a	1.15§	1.00a	1.00
WESTERN:						
Atchison, Kans.	.50	.....	2.00	2.00	2.00	1.60||
Blue Spr'gs & Wymore, Neb.	.20	1.45	1.45	1.35@1.40	1.25@1.30	1.20
Cape Girardeau, Mo.	1.35	.....	1.25	1.25	1.00	.....
Kansas City, Mo.	1.00	1.65	1.65	1.65	1.65	1.65

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Branford, Conn.	.60	1.60	1.35	1.15	1.00	.....
Duluth, Minn.	.90@1.00	2.25	1.90@2.00	1.40@1.50	1.35@1.40	1.35@1.40
El Cerrito, Calif.	1.75	1.75	1.75	1.75	1.75	.....
Dwight, Calif.	1.75	1.75	1.75	1.75	1.75	.....
E. Summit, N. J.	1.50	2.00	1.80	1.40	1.40	.....
Eastern Maryland	1.10	1.75	1.70	1.60	1.50	1.50
Eastern Massachusetts	.85	1.75	1.75	1.25	1.25	1.25
Eastern New York	.75	1.25	1.25	1.25	1.25	1.25
Eastern Pennsylvania	1.10	1.75	1.70	1.60	1.50	1.50
Meriden, Middlefield, New Britain, Rocky Hill, Conn.	.60	1.60	1.35	1.15	1.00@1.10	1.00
Northern New Jersey	1.60	1.40	1.40	1.40	1.40	1.40
Oakland, Calif.	1.75	1.75	1.75	1.75	1.75	.....
Richmond, Calif.	.50	.....	1.50*	1.50*	1.50*	.....
San Diego, Calif.	.50@ .75	1.80@1.90	1.60@1.80	1.35@1.55	1.35@1.55	1.25@1.45
Springfield, N. J.	1.60	2.00	2.00	1.60	1.60	.....
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	.....

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Berlin, Utley and Red Granite, Wis.	1.60	1.70	1.60	1.50	1.40	.....
Eastern Penna.—Sandstone	1.25	1.65	1.60	1.40	1.40	1.25
Eastern Penna.—Quartzite	1.20	1.35	1.20	1.20	1.20	1.20
Lithonia, Ga.—Granite	.75	2.00	1.75	1.25	1.25	1.25
Lohrville, Wis.	1.65	1.65@1.70	1.65	1.45	1.50	.....
Middlebrook, Mo.—Granite	3.00@3.50	.....	2.00@2.50	2.00@2.25	.....	1.25@2.00
Northern New Jersey (Basalt)	150	2.00	1.80	1.40	1.40	.....

*Cubic yd. †1 in. and less. ‡Prices include 90c freight. ||Rip rap per ton. §Dust in. (a) Dust out. (b) less 10c 15 days.

Agricultural Limestone
(Pulverized)

Branchton, Penn.—100% thru 20 mesh; 60% thru 100 mesh; 45% thru 200 mesh. (Less 50 cents commission to dealers)	5.00
Osborne, Penn.—100% thru 20 mesh; 60% thru 100 mesh; 45% thru 200 mesh. (Less 50 cents commission to dealers)	5.00
Hillsville, Pa.—Analysis, 94% $CaCo_3$, 1.40% $MgCO_3$, 75% thru 100 mesh; 94% thru 50 mesh; sacks, 5.00; bulk	3.50
Jamesville, N. Y.—Analysis, 89.25% $CaCO_3$; 5.25% $MgCO_3$; pulverized, bags, 4.00; bulk	2.50
Rockdale, Mass.—Analysis, 90% $CaCO_3$—50% thru 100 mesh; paper bags, 4.75; cloth, 5.25; bulk	3.25
North Pownal, Vt.—Analysis, 90% $CaCO_3$—50% thru 100 mesh; paper bags, 4.75; cloth, 5.25; bulk	3.25
West Stockbridge, Mass.—Analysis, 90% $CaCO_3$—50% thru 100 mesh; paper bags, 4.75; cloth, 5.25; bulk	3.25
Dundas, Ont., Can.—Analysis, 53.80% $CaCO_3$, 43.31% $MgCO_3$; 35% thru 100 mesh. 50% thru 50 mesh, 100% thru 10 mesh; bags, 4.75; bulk	3.00
Marblehead, Ohio—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; 60% thru 100 mesh; 70% thru 50 mesh; 100% thru 10 mesh; 100% thru 4 mesh; 80 lb. paper sacks, 5.00; bulk	3.50
Piqua, Ohio—Total neutralizing power 95.3%; 100% thru 10, 60% thru 50; 50% thru 100	2.10@ 2.25
100% thru 10, 90% thru 50, 80% thru 100; bags, 5.00; bulk	3.50
100% thru 100, 85% thru 200; bags, 7.00; bulk	5.50
Mayville Wis.—59.8% thru 60 mesh	2.35
Cartersville, Ga.—Pulverized limestone	1.75
Knoxville, Tenn.—80% thru 100 mesh, bags, 3.95; bulk	2.70
Linville Falls, N. C.—Analysis, 57% $CaCO_3$, 39% $MgCO_3$; 50% thru 100 mesh; 200 lb. burlap bag, 4.00; bulk	2.75
Colton, Calif.—Analysis, 95% $CaCO_3$, 3% $MgCO_3$—all thru 20 mesh—bulk	4.00
Marion, Va.—Analysis, 90% $CaCO_3$, 2% $MgCO_3$; 42.5% thru 100 mesh, 11.3% thru 80, 20.2% thru 60, 22.8% thru 40, 3.2% thru 20 and under or 75% thru 40 mesh; pulverized, per ton	2.00

Agricultural Limestone
(Crushed)

Bedford, Ind.—Analysis, 98½% $CACO_3$, ½% $MgCO_3$; 90% thru 10 mesh	1.50@ 2.00
Independence, Mo.—Analysis, 94% $CaCO_3$	1.25
Bettendorf, Iowa—97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh	1.50
Blackwater, Mo.—95% $CaCO_3$; 100% thru 8 mesh	1.00
Cape Girardeau, Mo.—Analysis, 93% $CaCO_3$, 3.5% $MgCO_3$; 90% thru 50 mesh	1.50
Alton, Ill.—Analysis 99% $CACO_3$; 100% thru 4 mesh	1.75
Gary, Ill.—Analysis, 60% $CaCO_3$, 40% $MgCO_3$; 90% thru 100 mesh	1.10
Cypress, Ill.—Analysis, 96% $CaCO_3$, 2.5% $MgCO_3$; 50% thru 50 mesh	1.25
Kansas City, Mo.—50% thru 100 mesh	1.25
Moline, Ill.—97% $CaCO_3$, 2% $MgCO_3$—50% thru 100 mesh; 50% thru 4 mesh	1.50

(Continued on next page)

Agricultural Limestone

(Continued from preceding page)

Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% through 10 mesh; 46% through 60 mesh	2.00
Screenings (¼ in. to dust)	1.00
Marblehead, Ohio.—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; 100% thru 4 mesh; 85% thru 10 mesh; 53% thru 50 mesh; 40% thru 100 mesh (meal) bulk	1.60
32% thru 100 mesh; 51% thru 50 mesh; 83% thru 10 mesh; 100% 4 mesh (screenings) bulk	1.25
Milltown, Ind. — Analysis, 91.95% $CaCO_3$, 4.87% $MgCO_3$; 36% thru 100 mesh, 43.2% thru 50 mesh	1.45@ 1.60
River Rouge, Mich.—Analysis, 54% $CaCO_3$, 40% $MgCO_3$; bulk	.80@ 1.40
Stone City, Iowa. — Analysis, 98% $CaCO_3$; 50% thru 50 mesh	.75
Bridgeport, Texas:	
Screenings from ⅛ in. down to flour	1.50
Chico, Texas:	
Screenings from ⅛ in. down to flour	1.50
Alderson, W. Va. — Analysis, 90% $CaCO_3$; 50% thru 100 mesh	1.50
Ft. Springs, W. Va.—Analysis, 90% $CaCO_3$; 50% thru 100 mesh	1.50

Miscellaneous Sands

Silica sand is quoted washed, dried and screened unless otherwise stated.

Glass Sand:	
Berkeley Springs, W. Va.	2.25@ 2.50
Cedarville, N. J.—Damp	1.75
Dry	2.25
Cheshire, Mass:	
6.00 to 7.00 per ton; bbl.	2.50
Columbus, Ohio	1.50@ 1.75
Grays Summit and Klondike, Mo.	2.00
Mapleton, Pa.	2.00@ 2.50
Mapleton Depot, Pa.	2.25@ 2.50
Massillon, Ohio	3.00
Michigan City, Ind.	.50
Mineral Ridge, Ohio	2.50
Ottawa, Ill.	1.25@ 1.50
Pacific, Mo.	2.25@ 3.00
Pittsburgh, Pa.—Dry	4.00
Damp	3.00
Ridgway, Pa.	2.50
Rockwood, Mich.	2.75@ 3.25
Round Top, Md.	2.25
San Francisco, Calif.	3.00@ 3.50
St. Louis, Mo.	1.50@ 3.00
South Vineland, N. J.—Damp	1.75
Dry	2.25
Thayers, Pa.	2.50
Utica, Ill.	1.25 1.40
Zanesville, Ohio	2.50
Foundry Sand:	
Albany, N. Y.:	
Core	1.50
Molding fine, brass molding	2.25
Molding coarse	2.00
Sand blast	4.00
Arenzville, Ill.—Molding fine	1.50@ 1.70
Brass molding	1.75
Cheshire, Mass.—Furnace lining, molding fine and coarse	5.00
Sand blast	5.00@ 8.00
Stone sawing	6.00
Columbus, Ohio:	
Core	.25@ .35
Furnace lining	2.00@ 2.50
Molding fine	1.50@ 2.00
Molding coarse	1.50@ 1.75
Sand blast	3.50@ 5.00
Stone sawing	1.50
Traction	.25@ 1.00
Brass molding	2.00

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, f. o. b. producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Ambridge and So. Hts., Pa.	1.25	1.25	1.15	.85	.85	.85
Attica, N. Y.	.75	.75	.85	.75	.75	.75
Buffalo, N. Y.	1.10	.95	.....	.....	.85	.....
Erie, Penn.	.....	1.00*	1.50*	.....	2.00*	.....
Farmingdale, N. J.	.48	.48	.75	1.10	1.10	.....
Franklinville, N. Y.	.75	.75	.85	.75	.75	.75
Leeds Jct., Maine	.....	.50	1.75	.....	1.35	1.25
Machias, N. Y.	.75	.75	.75	.75	.75	.75
Northern New Jersey	.....	.60	1.25	1.25	1.25	1.25
Pittsburgh, Pa., and vicinity	1.25	1.25	.85	.85	.85	.85
Washington, D. C.—Rewashed, river	.85	.85	1.70	1.50	1.30	1.30
CENTRAL:						
Attica, Ind.	.75	.75	.75	.75	.75	.75
Barton, Wis.	.....	.70	.....	.60	.60	.....
Columbus, Ohio	.85	.85@1.20	.85@1.00	.75@ .90	.75	.75
Covington, Ind.	.75	.75	.75	.75	.75	.75
Des Moines, Iowa	.50	.50	1.25	1.60	1.60	1.60
	Unwashed ballast, .50 ton					
Eau Claire, Wis.	.40	.40	1.00@1.25	.....	.....	.85
Elkhart Lake, Wis.	.44	.40	.50	.60	.60	.60
Ft. Dodge, Iowa	1.00	1.00	2.10	2.10	2.10	2.10
Grand Rapids, Mich.	.....	.50	.....	.80	.70	.70
Hamilton, Ohio	.....	1.00	.....	.....	1.00	.....
Hersey, Mich.	.50	.....	.....	.....	.....	.75
Indianapolis, Ind.	.60	.60	.....	.90	.75@1.00	.75@1.00
Janesville, Wis.	.....	.65@ .75	.....	.....	.65@ .75	.....
Mason City, Iowa	.45@ .55	.45@ .55	1.55	1.55	1.45	1.45
Mankato, Minn.	.....	.40	.40	.....	1.25	.....
Milwaukee, Wis.	1.01	1.01	1.21	1.21	1.21	1.21
Minneapolis, Minn.	.35	.35	1.35	1.35	1.35	1.25
Moline, Ill.	.60	.60	1.20	1.20	1.20	1.20
Palestine, Ill.	.75	.75	.75	.75	.75	.75
St. Louis, Mo., f.o.b cars	1.20	1.45	1.65§	1.45	.....	1.45‖
Silverwood, Ind.	.75	.75	.75	.75	.75	.75
Summit Grove, Ind.	.75	.75	.75	.75	.75	.75
Terre Haute, Ind.	.75	.60	.75	.90	.90	.85
Waukesha, Wis.	.50	.50	.80	.80	.80	.80
Yorkville, Sheridan, Oregon, Moronts, Ill.			.37 to .65 pit			
Zanesville, Ohio	.70	.....	.60	.....	.90	.....
SOUTHERN:						
Brookhaven, Miss., Roseland La.	.....	1.35	.....	.....	1.25	.....
Charleston, W. Va.	all sand 1.37 f.o.b cars		all gravel 1.47 f.o.b. cars			
Knoxville, Tenn.	1.00	1.00	1.20	1.20	1.20	1.20
Macon, Ga.	.50	.50	.....	.75	.75	.75
New Martinsville, W. Va.	1.00	1.00	.....	1.20	.....	.80
WESTERN:						
Baldwin Park, Calif.	.....	.25@ .35	.....	.....	.50@ .75	.....
Crushed rock	.90@1.10	.60@ .90	.60@ .90	.60@ .90	.60@ .90	.....
Kansas City, Mo.	Kaw river sand .75 per ton f.o.b. plants					
Los Angeles, Calif.	.70	.70	1.10@1.15	.....	1.10@1.15	.....
Pueblo, Colo.	1.10*	.90*	.....	1.75*	.....	1.60*
San Diego, Calif.	50@ .65	.80@ .90	1.40@1.50	1.20@1.30	1.00@1.10	1.00@1.10
Seattle, Wash. (bunkers)	1.50*	1.50*	.....	1.50*	.....	1.50*

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
Boonville, N. Y.	.60@ .80	.....	.55@ .75	.....	.....	1.00
Brookhaven, Miss., Rosel'd, La.	.75	.50	.....	.....	1.25	.....
Dudley, Ky.‡	1.05	1.05	.....	.95	.....	.....
East Hartford, Conn.	Sand, .65 per cu. yd.					
Elkhart Lake, Wis.	.40	.....	.....	.....	.....	.....
Gainesville, Texas	.....	.95	.....	.....	.....	.55
Grand Rapids, Mich.	.....	.....	.....	.80	.....	.....
Hamilton, Ohio	.....	.....	.....	.....	.70	.....
Hersey, Mich.	.....	.....	.....	.55	.....	.....
Indianapolis, Ind.	Mixed gravel for concrete work, .65					
Lindsay, Texas	.....	.95	.....	.....	.....	.55
Mankato, Minn.	Pit run gravel, .50					
Moline, Ill.	.60	.60	Concrete gravel, 50% G., 50% S., 1.00			
Montezuma, Ind.	.....	.....	.....	.....	.....	.60
St. Louis, Mo.	.....	.....	.....	.....	.....	1.55
Summit Grove, Ind.	.50	.50	.50	.50	.50	.50
Waukesha, Wis.	.60	.60	.60	.60	.60	.60
Zanesville, Ohio	.....	.60	.....	.....	.....	.....

*Cubic yd.; †pebbles; §⅝ in. and less; ‡crushed rock; ‖2½ in. and less; (a) ¾ in. and less.

Miscellaneous Sands

(Continued from preceding page)

Delaware, N. J.:	
Molding fine	2.00
Molding coarse	1.90
Brass molding	2.15
Dunbar, Pa.:	
Traction (Mill)	2.25
Eau Claire, Wis.:	
Roofing sand, sand blast	3.25
Franklin, Pa.:	
Core, molding coarse	2.00
Furnace lining	2.50
Brass molding	2.75
Grays Summit and Klondike, Mo.:	
Molding fine	1.75@ 2.00
Joliet, Ill.:	
No. 2 molding sand and loam for luting purposes; milled	.85
Bank run	.65
Kasota, Minn.:	
Stone sawing (green)	1.50
Mapleton, Pa.:	
Molding fine, roofing sand	2.25
Mapleton Depot, Pa.:	
Molding coarse, roofing sand	2.25
Molding fine	2.50
Traction	2.00@ 2.25
Massillon, Ohio:	
Molding fine, coarse, furnace lining and core	2.50
Traction	2.50
Michigan City, Ind.:	
Core	.50@ .55
Traction	.40
Mineral Ridge and Ohlton, Ohio:	
Core (damp)	1.90
Furnace lining, roofing sand, stone sawing, traction (green)	1.75
Molding fine and coarse (green)	2.00
Montoursville, Pa.:	
Core	1.25@ 1.40
Traction	1.10
Brass molding	1.50
New Lexington, Ohio:	
Molding fine	2.00
Molding coarse	1.50
Ottawa, Ill.:	
Crude silica sand	.75@ 1.00
Core, furnace lining, steel molding	1.50
Roofing sand	1.50@ 4.50
Sand blast	4.50
Ottawa, Minn.:	
Crude silica sand	.75@ 1.00
Pacific, Mo.:	
Core, furnace lining	1.00@ 1.25
Molding fine	.90@ 1.00
Stone sawing	1.00@ 1.75
Molding coarse	.85@ 1.00
Ridgway, Pa.:	
Core	2.00
Furnace lining, molding fine, molding coarse	1.25
Traction	2.25
Rockwood, Mich.:	
Roofing sand	3.00
Sand blast	3.75
Round Top, Md.:	
Core	1.60
Traction	1.75
St. Louis, Mo.:	
Core	1.00@ 1.75
Furnace lining	1.50
Molding fine	1.50@ 2.50

Crushed Slag

City or shipping point	Roofing	¼ in. down	½ in. and less	¾ in. and less	1½ in. and less	2½ in. and less	3 in. and larger
EASTERN:							
Buffalo, N. Y.	2.35	1.25	1.25	1.25	1.25	1.25	1.25
E. Canaan, Conn.	4.00	1.00	2.00	1.25	1.25	1.15	1.15
Eastern Penn. and Northern N. J.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Reading, Pa.	2.50	1.00		1.25			
Western Penn.	2.50	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Ironton, Ohio		1.45		1.45	1.45	1.45	
Jackson, Ohio		1.30		1.30	1.30	1.30	
Toledo, O.	1.50	1.35	1.50	1.35	1.35	1.35	1.35
Youngstown, Dover, Hubbard, Leetonia, Struthers, O.	2.00	1.25	1.35	1.35	1.25	1.25	1.25
SOUTHERN:							
Ashland, Ky.		1.55		1.55	1.55	1.55	
Ensley and Alabama City, Ala.	2.05	.80	1.25	1.15	.90	.90	.80
Longdale, Goshen, Glen Wilton, Roanoke, Ruesens, Va.	2.50	1.00	1.25	1.25	1.25	1.15	1.15

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Blk.	Ground burnt lime, Bags	Lump lime, Blk.	Lump lime, Bbl.
EASTERN:								
Bellefonte, Pa.		10.50*	10.50*	10.50*	9.00		8.50	1.80
Buffalo, N. Y.				12.00				
Berkeley, R. I.			12.00					2.30
Lime Ridge, Pa.							5.00a	
Williamsport, Pa.			10.00				6.00	
CENTRAL:								
Cold Springs, Ohio		11.00	10.00		9.00	11.00‖	10.00	
Delaware, Ohio	12.50	9.00	9.00	10.50			9.00	1.60
Gibsonburg, Ohio	12.50				9.00			
Huntington, Ind.		9.50	9 50		9.00		8.50	1.60c
Luckey, Ohio	12.50‡							
Marblehead, Ohio		9.50	9.50				8.50	1.60d
Marion, Ohio		9.50	9.50				8.50	1.60d
Mitchell, Ind.		12.00	12.00	12.00	11.00		10.00	1.70k
Sheboygan, Wis.							9.50	
Tiffin, Ohio					9.00			
White Rock, Ohio	12.50				9.00	11.00		
Woodville, Ohio	12.50‡	11.00‡	9.00‡		9.00		9.00	1.60
SOUTHERN:								
Erin, Tenn.							8.50	1.40†
Graystone and Wilmay, Ala.	12.50	11.00		11.00@12.50			8.50	1.50
Karo, Va.							7.00	1.50
Puntenny, Ariz.					10.00h	.90i	9.50h	1.70j
Varnons, Ala. (l)	11.00	11.00	11.00	11.00	9.50	.67½g	8.50	1.50
Zuber and Ocala, Fla.	14.00	12.00	10.00				11.00	1.60
WESTERN:								
Colton, Calif.			15.00				19.70	
Kirtland, N. M.							15.00	
San Francisco, Calif.	22.00	22.00	15.00	22.00				2.50
Tehachapi, Calif.							15.00	2.25

*Paper sacks; †and 1.50; ‡50-lb. paper bags, terms 30 days net, 25c per ton or 5c per bbl. discount for cash in 10 days from date of invoice; (a) f.o.b. kilns; (b) 180 lb. net, 2.65, 280 lb. net; (c) wooden bbl.; (d) wooden, steel, 1.70; (e) wooden bbl., steel bbl., 2.20; (g) per bag of 90 lb.; (h) to 12.50; (i) to 1.00 90-lb. sack, 25c credit if returned; (j) to 2.10; (k) wooden bbl., steel 2.20; (l) dealers' prices.

Miscellaneous Sands

(Continued)

Molding coarse	1.25@ 1.75
Roofing sand	1.75
Sand blast	3.50@ 4.50
Stone sawing	1.25@ 2.25
Traction	1.25
Brass molding	2.00@ 3.00
San Francisco, Calif.:	
(Washed and dried)—Core, molding fine, roofing sand and brass molding	3.00@ 3.50
(Direct from pit)	
Furnace lining, molding coarse, sand blast	3.60
Stone sawing, traction	2.30
Tamalco, Ill.:	
Molding coarse	1.40@ 1.60
Brass molding	1.75
Tamms, Ill.:	
Ground silica per ton in carloads	20.00@31.00
Thayers, Pa.:	
Core	2.00
Furnace lining	1.25
Molding fine and coarse	1.50
Traction	2.00
Utica, Ill.:	
Core (crude and dry)	.75@ 1.25
Furnace lining	1.25@ 2.00
Molding fine	.75
Molding coarse	.85
Roofing sand (fine and coarse)	1.25@ 2.25
Sand blast	2.25
Stone sawing	1.25@ 2.25
Traction	1.25
Brass molding	1.25
Warwick, Ohio:	
Core, furnace lining, molding fine and coarse, brass molding (all green), 1.75; all dry	2.75
Traction (dry)	2.75
Zanesville, Ohio:	
Sand blast	2.50
Core	2.00
Molding fine	2.00
Molding coarse	1.50
Furnace lining	2.00
Traction	2.00

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

Baltimore, Md.:	
Crude talc (mine run)	3.00@ 4.00
Ground talc (20-50 mesh), bags	10.00
Cubes	55.00
Blanks (per lb.)	.08
Pencils and steel workers' crayons, per gross	1.25
Chatsworth, Ga.:	
Ground (20-50 mesh), ton	7.50
Ground (150-200 mesh), bags	8.00@12.00
Chester, Va.:	
Crude talc, per ton	4.00
Ground talc (150-200 mesh), bulk ton	7.50@ 9.00
Bags	8.50@10.00
E. Granville, Rochester, Johnson, Waterbury, Vt.:	
Ground talc (20-50 mesh) bags	7.00@10.00
Ground talc (150-200 mesh) bags	10.00@25.00
Pencils and steel workers' crayons, per gross	.75@ 2.00
Emeryville, N. Y.:	
(All air floated)—325 mesh, bags	14.75
150-200 mesh, bags	13.75
Henry, Va.:	
Crude talc (mine run) per 2000-lb. ton	3.00@ 4.00
Ground (150-200 mesh), bags	8.75@14.00
Keeler, Calif.:	
(150-200 mesh); carloads, 60,000 lbs. (bags extra)	20.00@30.00
Marshall, N. C.:	
Ground (20-50 mesh), ton	7.50
Ground (150-200 mesh), bags	8.00@12.00
Natural Bridge, N. Y.:	
Ground talc (300-325 mesh), 200-lb. bags	13.00@15.00
Waterbury, Vt.:	
Ground talc (20-50 mesh), bulk (Bags extra)	7.50@10.00
Ground talc (150-200 mesh), bulk (Bags extra)	10.00@22.50
Pencils and steel workers' crayons, per gross	1.20@ 2.50

Rock Phosphate

(Raw Rock)

Per 2240-lb. Ton

Centerville, Tenn.—B.P.L. 65%, bags	8.50
Bulk	6.50
Gordonsburg, Tenn.—B.P.L. 65-68%	4.50@ 5.50
Tennessee—F. O. B. mines, gross ton, unground Tenn. brown rock, 72% min. B.P.L.	5.50

(Continued on next page)

Roofing Slate

The following prices are per square (100 sq. ft.) for Pennsylvania Blue-Clay Roofing Slate, f. o. b. cars quarries:

Sizes	Genuine Bangor, Washington Big Bed, Franklin Big Bed	Genuine Albion	Slatington Small Bed	Genuine Bangor Ribbon
24x12	$10.20	$10.00	$8.10	$7.80
24x14	10.20	10.00	8.10	7.80
22x12	10.80	10.00	8.40	8.75
22x11	10.80	10.50	8.40	8.75
20x12	12.60	10.50	8.70	8.75
20x10	12.60	11.00	8.70	8.75
18x10	12.60	11.00	8.70	8.75
18x 9	12.60	11.00	8.70	8.75
16x10	12.60	11.00	8.40	8.75
16x 9	12.60	11.00	8.40	8.75
16x 8	12.60	11.00	8.40	8.75
18x12	12.60	11.00	8.70	8.75
16x12	12.60	11.00	8.40	8.75
14x10	11.10	11.00	8.10	7.80
14x 8	11.10	10.50	8.10	7.80
14x 7 to 12x6	9.30	10.50	7.50	7.80
	Mediums	Mediums	Mediums	Mediums
24x12	$ 8.10	$8.10	$7.20	$5.75
22x11	8.40	8.40	7.50	5.75
Other sizes	8.70	8.70	7.80	5.75

For less than carload lots of 20 squares or under, 10% additional charge will be made.

(Continued from preceding page)

(Ground Rock)

Mt. Pleasant, Tenn.—B.P.L. 65%; per 2000 lb. ton	6.50
Twomey, Tenn.—B.P.L. 65%	6.50@ 7.50

Florida Soft Phosphate

(Raw Land Pebble)

Per Ton

Florida—F. O. B. mines, gross ton, 68/66% B.P.L.	2.25
70% min. B.P.L.	2.50
72% min. B.P.L.	2.75
75/74%	3.75
Jacksonville (Fla.) District	10.00@12.00

(Ground Land Pebble)

Per Ton

Jacksonville (Fla.) District	14.00
Add 2.50 for sacks.	
Morristown, Fla.—26% phos. acid	16.00

Fluorspar

Fluorspar—80% and over calcium fluoride, not over 5% silica; per ton f.o.b. Illinois and Kentucky mines	20.00@22.00
Fluorspar—85% and over calcium fluoride, not over 5% silica; per ton f.o.b. Illinois and Kentucky mines	22.00@23.50

Special Aggregates

Prices are per ton f. o. b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco chips
Barton, Wis., f.o.b. cars		10.50
Chicago, Ill.—Stucco chips, in sacks f.o.b. quarries		17.50
Easton, Pa.—Slate granules		6.50@ 7.00
Haddam, Conn. — Felstone buff	12.00	12.00
Harrisonburg, Va.—Blk. marble (crushed, in bags	14.50@22.50	14.50@22.50
Ingomar, Ohio (in bags)		6.00@25.00
Middlebrook, Mo.—Red		25.00@30.00
Milwaukee, Wis.		14.00@34.00
Newark, N. J.—Roofing granules		7.50
New York, N. Y.—Red and yellow Verona		32.00
Phillipsburg, N. J.—Evergreen, bulk	8.00@10.00	8.00@10.00
Creme and royal, bulk	15.00@20.00	15.00@20.00
Red Granite, Wis.		7.50
Sioux Falls, S. D.	7.50	7.50
Tuckahoe, N. Y.—2000 lb.		12.00
Whitestone, Ga.—White marble chips, net ton in bulk, f.o.b. cars, granite	4.50@ 6.00	4.50@ 6.00

Concrete Brick

Prices given per 100 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	22.00	25.00@32.00
Ensley, Ala. ("Slagtex")	12.50	33.50
Friesland, Wis.	22.00	32.00
Omaha, Neb.	18.00	30.00@40.00
Portland, Ore.	21.00	30.00@60.00
Puyallup, Wash.	20.00	30.00@90.00
Rapid City, S. D.	18.00	25.00@40.00
Salem, Ore.	23.00	50.00
Wauwatosa, Wis.	14.00@15.00	28.00@75.00
Winnipeg, Can.	15.50	

Sand-Lime Brick

Prices given per 1000 brick f. o. b. plant or nearest shipping point, unless otherwise noted.

Barton, Wis.	10.50
Boston, Mass.	15.00@16.50
Dayton, Ohio	12.50@13.50
Grand Rapids, Mich.	11.00
Jackson, Mich.	13.00
Lancaster, N. Y.	13.00
Michigan City, Ind.	11.00
Milwaukee, Wis. (delivered)	13.00
Plant City, Fla.	10.00@15.00
Portage, Wis.	15.00
Rives Junction and Saginaw, Mich.	12.00
Saginaw, Mich.	12.00
San Antonio, Tex.	12.50@13.50
Syracuse, N. Y. (delivered at job)	15.00@16.00
F.o.b. cars	17.00

Gray Klinker Brick

El Paso, Texas	13.00

Lime

Warehouse prices, carload lots at principal cities.

	Hydrated, Finishing	per ton Common
Atlanta, Ga.	22.50	14.00
Baltimore, Md.	24.25	17.85
Cincinnati, Ohio	16.80	14.30
Chicago, Ill.	20.00	20.00
Dallas, Tex.	20.00	.....
Denver, Colo.	24.00	.....
Detroit, Mich.	22.00	20.00
Minneapolis, Minn. (white)	25.50	21.00
Montreal, Que.	21.00	.....
New York, N. Y.	18.20	13.10
St. Louis, Mo.	18.74	12.40
San Francisco, Calif.	22.60	.....
Seattle, Wash. (paper sacks)	24.00	.....

Portland Cement

Prices per bbl. and per bag net in carload lots.

	Per Bag	Per Bbl.
Atlanta, Ga.	.....	2.35
Boston, Mass.	.....	2.63@3.03†
Buffalo, N. Y.	.....	2.48@2.88†
Cedar Rapids, Iowa	.60	2.40
Cincinnati, Ohio	.61¾	2.47
Cleveland, Ohio	.59¾	2.39
Chicago, Ill.	.55	2.20
Columbus, Ohio	.....	2.44
Dallas, Texas	.53¾	2.15
Davenport, Iowa	.59¾	2.39
Dayton, Ohio	.....	2.48
Denver, Colo.	.63¾	2.55
Detroit, Mich.	.60	2.40
Duluth, Minn.	.54¾	2.25
Indianapolis, Ind.	.60¼	2.41
Kansas City, Mo.	.54¼	2.37
Los Angeles, Cal. (less 5c dis.)	.60	3.08
Memphis, Tenn.	.....	2.60
Milwaukee, Wis.	.58¾	2.35
Minneapolis, Minn.	.60½	2.42
Montreal, Canada (sks. 20c ext.)	.....	1.90b
New Orleans, La.	.....	2.40
New York, N. Y.	.....	2.25@2.65†
Philadelphia, Pa	.....	2.41@2.81†
Phoenix, Ariz.	.82½	3.30
Pittsburgh, Pa.	.54¾	2.19
Portland, Ore.	.....	3.05
San Francisco, Cal.	.....	2.61*
St. Louis, Mo.	.57½	2.30
St. Paul, Minn.	.60½	2.42
Seattle, Wash. (10c bbl. dis.)	.....	2.90
Toledo, Ohio	.61¼	2.45

NOTE—Add 40c per bbl. for bags.
*5c cash disc. 10 days.
†Prices to contractors, including bags.
(b) Less 10c 20 days.

Mill prices f. o. b. in Carload Lots to Contractors

	Per Bag	Per Bbl.
Buffington, Ind.	.48¾	1.95
Concrete, Wash.	.....	2.60
Dallas, Texas	.....	2.10
El Paso, Tex.	.70	2.08*
Hannibal, Mo.	.....	1.95
Hudson, N. Y.	.....	2.05
Leeds, Ala.	.....	1.95
Los Angeles, Calif.	.....	2.65
Louisville, Ky.	.....	2.35
Northampton, Pa.	.....	1.95
Phoenix, Ariz.	.....	4.30†
Steelton, Minn.	.50	2.00
Universal, Pa.	.48¾	1.95

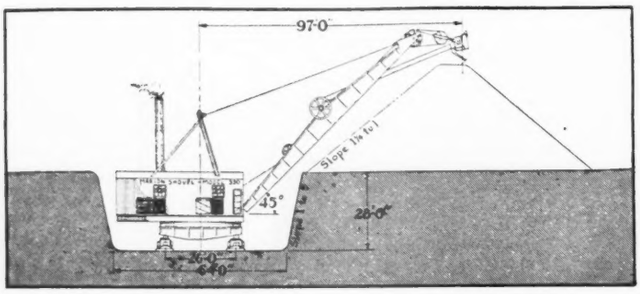
*Gross, 10c sacks and 10c per bbl. disc 10 days.
†Gross, 15c sacks and 5c per bbl. disc. 10 days.

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F. O. B. MILL

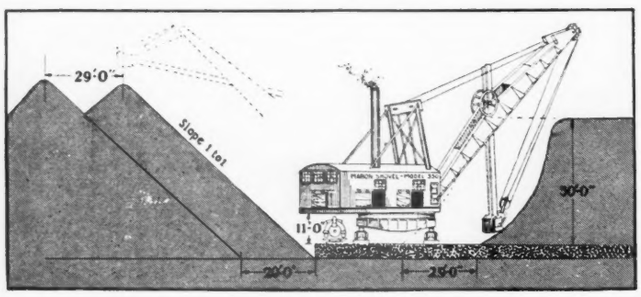
	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco Calcined Gypsum	Cement and Gauging Plaster	Wood Fiber	White Gauging	Sanded Plaster	Keene's Cement	Trowel Finish	Plaster Board ¼x32x36" Weight 1500 lb. Per M Sq. Ft.	Plaster Board ⅜x32x36" Weight 1850 lb. Per M Sq. Ft.	Wallboard, ⅜x32 or 48" Lengths 6'-10', 1850 lb. Per M Sq. Ft.
Agatite, Texas (a)	.....	.....	6.00	10.00	10.00	10.50	10.00	.....	19.00	.....	.....	.....	.....
Akron, N. Y. (a)	3.00	4.00	6.00	10.00	10.00	10.00	20.20	7.00@9.00	27.35	21.00	19.375	20.00	30.00@32.00
Blue Rapids, Kans. (a)	2.50	4.00	6.00	10.00	10.00	10.50	10.00	.....	23.15	19.00	19.375	20.00	.....
Denver, Colo.	.....	.....	.....	11.80	.....	.....	.....	.....	.....	.....	.....	.....	.....
Douglas, Ariz.	.....	.....	6.00	.....	15.00	.....	.....	.....	.....	15.50	.....	.....	.....
Ft. Dodge, Iowa (a)	2.50	4.00	6.00	10.00	10.00	10.50	15.45	.....	22.70	20.00	19.375	20.00	30.00
Grand Rapids, Mich.	2.75	.....	6.00	10.00	10.00	10.00	.....	.....	.....	.....	20.00	21.00	30.00
Gypsum, Ohio (a)	2.75	4.00	6.00	10.00	10.00	10.00	19.25	7.50	26.85	19.00	19.375	20.00	30.00
Port Clinton, Ohio	3.00	4.00	6.00	8.00	10.00	10.00	.....	7.50	30.15	.....	.....	20.00	30.00
Portland, Colo.	.....	.....	.....	10.00	.....	.....	.....	.....	.....	.....	.....	.....	.....
San Francisco, Calif.	.....	12.00	12.00	15.40†	.....	.....	16.40‡	.....	.....	.....	.....	.....	.....
Winnipeg, Man.	5.50	5.50	7.00	13.50	15.00	15.00	.....	.....	.....	.....	28.50	.....	35.00

NOTE—Returnable Bags, 10c each; Paper Bags $1.50 per ton extra (not returnable).
†CL.; LCL., $16.50; ‡finishing, CL.; LCL., $17.50; (a) prices are net of bags.

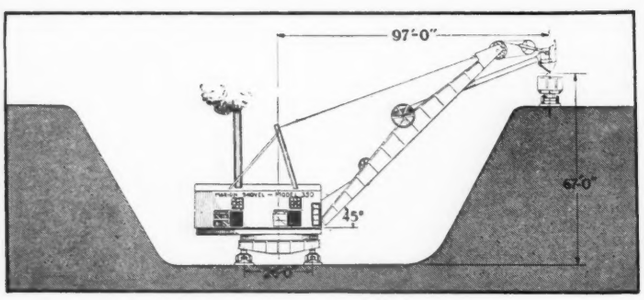
New Machinery and Equipment



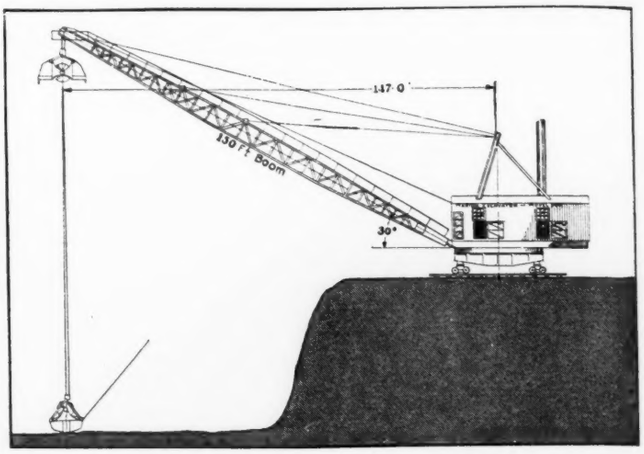
Showing height and reach of Model 350



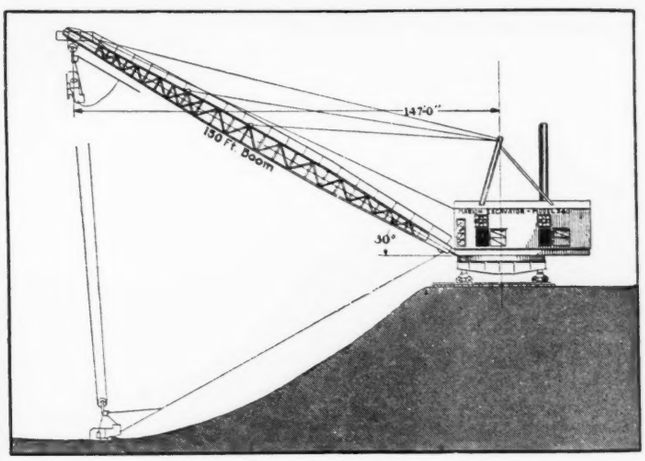
A 15-ton locomotive can pass under the body



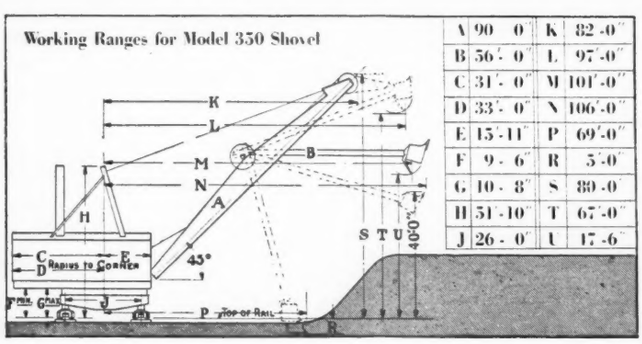
Loading cars on level above excavation



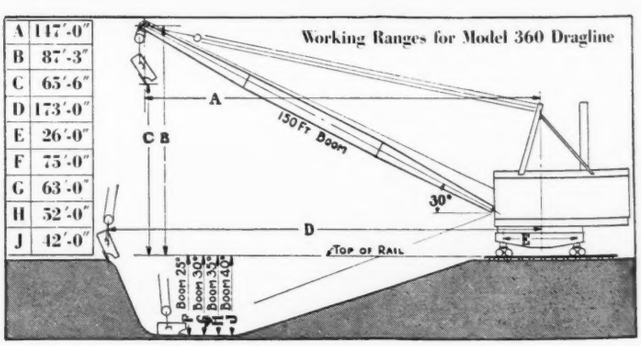
Model 360 with dragline bucket



Model 360 with clamshell



Dimensions of Model 350



Dimensions of Model 360

Marion 350 Shovel and 360 Dragline

THE pictures shown above on this page illustrate the application of the Marion 350 shovel and 360 dragline to various sorts of work, and they have been chosen instead of the usual half-tone because they show the capabilities of the machine so much better.

These machines are said by the makers to be the largest excavators made. The shovel is fitted with an 8-yd. dipper and the dragline with a 6-yd. bucket as standard equipment. The working weight of the shovel, steam equipped, is 960,000 lb.; electrically equipped it is 910,000 lb. The dragline weighs 880,000 lb. with

steam engine and 830,000 lb. with electric motor.

The dragline may be equipped with a 5-yd. clamshell or 4-yd. orangepeel bucket, which it can handle easily at the end of its 150-ft. boom. Excavations can be made to a depth of 62 ft. with any one of the three buckets with one wrap of cable on the hoisting drum.

The shovel has a 90-ft. boom and a 56-ft. dipper handle. This combination enables it to do several things impossible with a smaller shovel. It can load into a car the top of which is 67 ft. above the grade on which the shovel rests, with the car 97 ft. away from the center of the shovel. This might simplfy matters considerably in certain quarry operation, by keeping the loading track above the face, as shown in one illustration.

The second cut from the top, showing the shovel working on a coal seam, also shows how the great size of the machine gives it peculiar advantages. There is room for a 15-ton dinkey to pass under the body of the shovel so that stripping or loading may be carried on without interference.

In spite of its great size, the shovel may be handled rapidly as it will make a complete cycle of operations in 45 sec., swinging through a 90 deg. angle.

The dragline with its long boom can make a complete cycle in one minute.

The makers claim that the 350 shovel when electrically equipped may be handled by one operator who controls all three of the principal movements, hoisting, rotating and crowding, so no crane man is required.

Both machines have the Marion patented method of levelling by hydraulic jacks which eliminates strains in moving up and provides a level platform for working so that transverse strains are obviated.

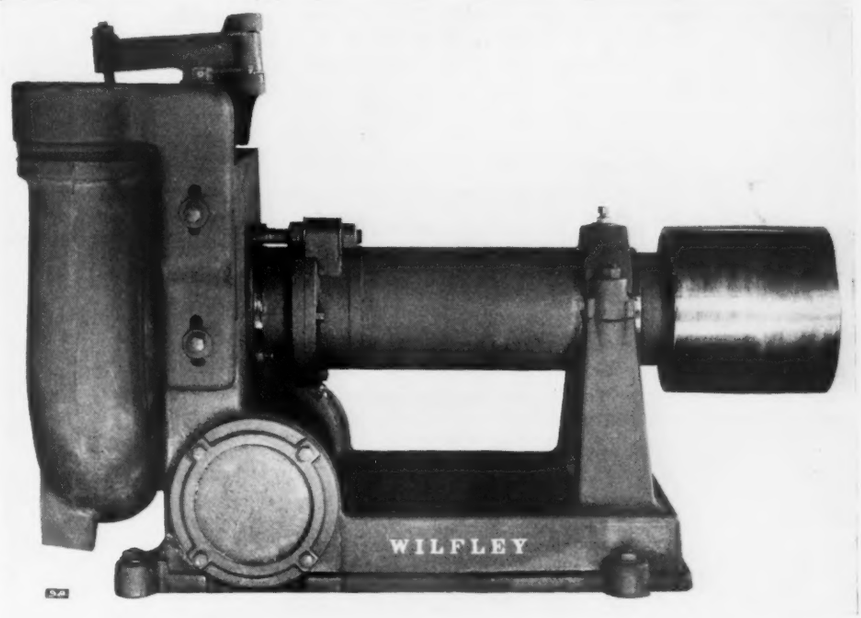
Building Code Requirements for Lime

EACH year sees more and more municipalities formulating building codes for the guidance and protection of their inhabitants and industries. Lime is being used extensively in mortar, plaster, stucco and concrete, and should be recognized in a building code. Bulletin 309, "Building Code Requirements for Lime," just issued by the National Lime Association, 918 G Street, N. W., Washington, D. C., offers sections suitable for direct incorporation in new or revised codes. These clauses and sections are the result of years of experience and bears the stamp of approval of the Building Officials Conference, which adopted them as tentative standards at their 1924 convention at Louisville, Ky.

Copies may be secured from any lime manufacturer upon request or direct from the National Lime Association.

The Wilfley Centrifugal Sand Pump

THERE has been a great development in the design of centrifugal pumps for handling clear water in the last decade or so but the design of pumps for handling sand and other gritty materials has undergone no important changes in the last quarter century. The Wilfley centrifugal sand pump is the first to show radical improvements in design as well as special features which increase the efficiency of the pump and lower the maintenance cost.



The crane for handling case shows on top and the bolt for adjusting follower ring above flange on shaft casing

The most important of these improvements is a new method for keeping the material pumped from leaking out around the shaft. The old method is to use a stuffing box into which a stream of clear water is forced at a higher pressure than that against which the pump is working. This clear water washes the sand back from the packing but the supplying of clear water usually takes another pump, dilutes the pulp, and is a nuisance to maintain, especially in freezing weather. In fact it has so many disadvantages that it is not uncommon to see pumps in which the use of a "water packing" has been discontinued because it has been considered less trouble to replace worn packing and a cut-out shaft than it was to attend to the water packing.

Mr. Wilfley has replaced the water packing by a little device he calls an "expeller" and an automatic check valve. The expeller is really a little pump, cast on the runner, which forces the material pumped away from the shaft and keeps it from leaking out. The check valve keeps the material from leaking out when the pump is not in motion.

The single objection to this method of protecting a pump is that the pump has no suction. It must be run "flooded," the feed always flowing to the pump. On the other hand it has the great advantage of preventing the pump from becoming "air bound" when the supply of feed is not equal to the capacity of the pump.

As the "expeller" has to work against the intake pressure only, there is very little wear on it. It requires practically no attention.

Another excellent feature of this pump is the method of adjusting the clearance between the runner and the follower plate. A single bolt does this. By turning this bolt the runner is brought up to where it rubs or grinds on the follower ring. Then the bolt is slackened off to where the ring and runner are just out of contact and the bolt is locked tight. This adjustment makes practically a ground joint and reduces clearance losses to a minimum. It may be made while the pump is in motion.

The construction of the pump permits dismantling by loosening only two bolts. The case which contains the runner is then swung out on a permanent crane and the runner may then be examined and if necessary replaced. It is not necessary to disconnect the discharge pipe to do this.

The pump is made in 2-in., 3-in., 4-in., 6-in., and 8-in. sizes. These sizes are rather small for sand and gravel dredging and the fact that the pump has no suction keeps it from being used for suction dredge work. But it might be used as a relay pump to good advantage, especially in connection with a dewatering tank.

The pump has already found many uses in the rock products industry. It is used as a slurry pump in portland cement mills, for pumping granulated slag in water, dolomite sands, and many other sands and slurries that contain gritty materials.

When Crushed Stone Is Not Crushed Stone

Roofing Granules Not Crushed Stone in Rate-Making Sense

IN a mimeographed report on I. and S. No. 2037, crushed stone from Maryland and Pennsylvania to New England and Trunk Line points, and No. 15314 (sub. No. 1), Lockport Paper Co. vs. Western Maryland et al., the commission said the carriers had justified, in part, proposed changes in rates and commodity descriptions on finely crushed green stone and crushed stone from Gladhill, Pa., and other Baltimore rate points to Niagara frontier, trunk line and New England points. It ordered them to cancel the schedules under suspension without prejudice, however, to filing new ones in compliance with the limitations set forth in the report.

It dismissed the formal complaint finding that rates on finely crushed green stone from the Gladhill district to Lockport, Pa., since December 4, 1921, not unreasonable or otherwise unlawful.

The Lockport Paper Co., manufacturer of prepared roofing which uses the finely crushed green stone in the preparation of roofing, was the protestant and formal complainant. The suspended schedules, the report said, were filed while the formal docket case was going on. The parties consented to having the two cases, separately heard, disposed of in one report.

In the suspended schedules the respondents proposed to reduce the rates on crushed stone from Gladhill, Advance and Maria Furnace, Pa., and Flint, Deerfield and Baltimore to Buffalo, Lockport and other Niagara frontier points from $3.28 to $3.05 per net ton, but restrict the rates to movement in open-top cars. They further proposed to add a new commodity description, namely, "stone chips and granules (roofing granules)" and to apply a rate of $3.40 on that commodity from and to the points mentioned. In addition they proposed to change the description from crushed stone to "stone chips or granules (roofing granules)" in certain items naming rates from the six points of origin mentioned to Jersey City and other trunk line and New England points.

In the formal complaint the paper company alleged that rates on crushed stone, from the Gladhill district to Lockport, since December 1, 1921, had been unreasonable, unjustly discriminatory and unduly prejudicial. New rates and reparation were asked. The complainant contended Lockport was in central territory and was therefore entitled to as low a basis of rates as accorded to other cities in that territory, because competitors were located at Chicago, St. Louis and other points in that territory. Extension of that basis to Lockport, the commission said, would give rates of $2.25 to Lockport and $2.35 to Erie, an intervener in behalf of the complainant having a plant at Erie.

The Western Maryland, which assumed the burden of defense, in justifying its proposed change in description said that crushed stone ordinarily implied a stone used in road making or concrete building construction and that the kind of stone contemplated in these rates was the finely crushed material, loaded in paper lined open-top cars, the shippers doing the lining. It contended that in as much as Lockport was a border point and that therefore, so far as transportation in trunk line territory was concerned, it was in trunk line territory. Its main justification, the commission said, was that the proposed rates would conform to the Philadelphia-Erie basis on both stone chips and granules and those on the competitive commodity, crushed slate. It said that reduced rates on ordinary crushed stone would also be improperly aligned if the tariffs were allowed to become effective. In disposing of the cases, the commission said:

> We find that respondents have justified the inclusion of the description "stone chips or granules (roofing granules)" in addition to the modified description of crushed stone in open-top cars and that the reduced rates proposed on the latter are justified. We further find that respondents have not justified the proposed increase in rates on the commodity which it is proposed to designate as stone chips or granules. The proposed schedules will be ordered canceled without prejudice to the filing of new schedules in conformity with our findings. We further find that the rates on crushed stone from the Cladhill district to Lockport charged on the finely crushed green stone shipped by complainant were not and are not unreasonable or otherwise unlawful. The complaint will be dismissed.

Commissioner Campbell dissented, but did not write his views on the matter.—*Traffic World.*

Concrete Ties Show Long Service Life

[Inasmuch as some form of concrete tie seems certain to be widely adopted by railroads in the not distant future, and as this adoption will open a wide field for the use of concrete aggregate, the following from *Railway Engineering and Maintenance* may interest ROCK PRODUCTS readers.]

THE Pennsylvania railroad has had a number of armored concrete ties in a test installation under heavy traffic which now have a life of 16 years and are still in good condition. This installation, numbering 15 ties, was recently removed in changing over from 100 to 130-lb. steel and after some slight repairs to a few were returned to service.

These ties were designed by L. J. Riegler, assistant engineer, in 1907, and consist essentially of two steel shells enclosing a reinforced concrete filler. The steel members are shaped to perform the double purpose of protecting the concrete from abrasion by the ballast and of acting as a beam to increase the stiffness of the tie.

Fifteen of these ties have been in the Pennsylvania tracks at Emsworth, Pa., since May, 1908, and from 1908 to 1914, they were subjected to a heavy, high speed, passenger traffic. In 1914 they were placed in another main track where they are subjected to a heavy freight and high speed through passenger traffic. All of the ties are still in the track. The ties at first supported 85-lb. A. S. C. E. rail, which was changed to 100-lb. P. S. in 1910. The 100-lb. rail was laid without changing the fastenings, but when the change was made from 100 to 130-lb rail in 1921, it was necessary to plane off the clips holding the rails to the ties. This could have been done without taking the ties from the track, but it was considered desirable to remove the ties temporarily, as it would give an excellent opportunity for thoroughly inspecting them and noting their condition after 13 years' service under the heavy tonnage.

While all of the ties are still in service a few have, from time to time, failed by cracking or wear of the concrete, requiring repair. During the 16-year period five of the ties have been repaired by cutting out some of the concrete and refilling. Two were repaired while in the track and three while out of the track.

Stone Crushing Plant Shut Down Because It Was Noisy

SUPREME Court Justice Arthur S. Tompkins has granted a permanent injunction to Prof. Harris F. MacNeiss of Columbia University, restraining the Tuckahoe Stone Corp. from operating its quarry and stone-crushing plant. Testimony was given at a hearing that the dust from the quarry ruined the landscape and the noise from the stone crusher disturbed Tuckahoe.

Justice Tompkins said in his decision: "I think the defendant's business is in violation of the restrictive covenant of the deeds conveying 400 or 500 lots of the North End Land and Improvement Co., from which the plaintiff and the defendant acquired their respective properties." He held that the grantor's intention was to exclude all manufacturing and business enterprises which might be offensive to the owners of homes. —*New York Times.*

News of All the Industry

New Incorporations

San Antonio Rock Co., Claremont, Calif., has been incorporated for $500,000.

Durling Lime Putty Co., Los Angeles, Calif., has been incorporated for $10,000.

National Rock Products Co., Los Angeles, Calif., has been incorporated for $150,000.

Cleghorn-Bemis Agricultural Lime Co., Highland, Calif., has been incorporated for $150,000.

Perrin Gravel and Supply Co. Ltd., Regina, Sask., Canada, has been incorporated with a capital of $20,000.

Zeller Concrete Material Co. has been incorporated in Watertown, S. D., for $25,000, by William Zeller, Ellen Zeller, and others.

Muscle Shoals Portland Cement Co., Sheffield, Ala., has been incorporated for $100,000 by Thurmond Harris, Samuel W. Kendall, and J. C. Harris, all of Sheffield.

Wallaceburg Sand and Gravel Co. Ltd., Wallaceburg, Ont., has been incorporated with a capital of $40,000 to deal in sand, gravel, stone, etc.

Christie Concrete Ltd., Lindsay, Ont., Canada, has been incorporated with a capital of $40,000 to manufacture and deal in cement, sand, gravel, stone, lime, etc.

Ontario Amiesite Ltd., Belleville, Ont., Canada, has been incorporated with a capital of $100,000 to quarry, mine and sell stone, gravel, lime, plaster, cement, brick, etc.

East River Stone Co., Bluefield, W. Va., has been incorporated for $25,000 by W. L. Mustard, R. C. Sproles, W. B. Hicks, J. C. Walters and P. L. Dye, all of Bluefield.

Hi-Frax Co., Minneapolis, Minn., has been incorporated for $50,000, to manufacture high temperature cement. Ralph B. Beal, 4624 Bryant avenue S., Minneapolis, is interested.

Ashland Sand and Gravel Co., Framingham, Mass., has been incorporated for $50,000 by Angelo N. Leverone, Eugene A. Leverone, and Edgar H. Roy, 426 Hollis street, Framingham, Mass.

New England Granite Works, Westerly, R. I., has been incorporated for 100 shares of common stock without par. Incorporators: Orlando R. Smith, Franklin C. Smith and Isaac G. Smith.

Limestone Products Co., Bluefield, W. Va., has been incorporated for $25,000 by C. L. Borden, F. H. Borden, C. A. Rothrock, C. S. McKinzie, Jr., and J. A. Koon, all of Bluefield.

Bluridge Mica Corp., Wilmington, Del., care of the Colonial Charter Co.. Ford Bldg., Wilmington, representative, has been incorporated to operate mica, feldspar, and other mineral properties for commercial production.

L. E. Rodgers Mineral Industries, Inc., Central Life Bldg., Ottawa, Ill., has been incorporated for $350,000 by Harry D. and Louis E. Rodgers to operate mining and refining plants for clay, shale and minerals.

George L. Morris, Inc., Los Angeles, Calif., has been chartered with a capital of $100,000, to handle building materials, by George L. and Ella Johnson Morris of Huntington Park, and Byron D. Seaver, of Los Angeles.

Brandon Rock Products Corp., Brandon, Vt., has been incorporated for $200,000 by E. A. Bellmore, Enoch C. Colby, and Edwin C. Rockwell, to engage in quarrying, crushing, burning, and dealing in limestone and marble.

Martin Stucco Co., San Francisco, has been incorporated for $50,000, by W. S. Hatch, H. C. Martin and R. L. Ulsh. The company operates a plant in Oakland, Calif., but the principal place of business will be in San Francisco.

Grace Feldspar Co., Newton, Conn., has been incorporated for $7000 to operate feldspar and other mineral properties for commercial production. Incorporators: Henry Warner and Victor A. Nelson, 8 Bates Place, Danbury, Conn.

Marine Sand and Gravel Co., 1111 Munsey Bldg., Baltimore, Md., has been incorporated for $100,000, by Joseph H. Hooper, 2644 N. Charles st., Francis H. Hammond, 1310 Bolton st., and others, and will establish an up-to-date gravel plant.

Silica Products Co., San Francisco, Calif., has been incorporated for $400,000 by W. D. Gray, A. S. Hutchinson, Edward Molkenbuhr, H. J. Jepsen, R. L. Hussey, O. Fehlen, and B. Archibald. Attorney: Charles A. Gray, 625 Market street, San Francisco.

Virginia-Chesapeake Soapstone Corporation, Norwood, Va., has been incorporated for $100,000 to $200,000 to manufacture and sell soapstone and its by-products. Thomas H. Armstrong, president; W. P. Benjamin, secretary; and Louis B. Rolston. (All of New York.)

Southern Illinois Limestone Co., Harrisburg, Ill., has been incorporated for $75,000 to mine and sell limestone, minerals, etc. Incorporators: W. A. Grant, John B. Lee, and Carl Woolcott. Correspondent: Miley and Combe, 603 First Trust and Savings Bank, Harrisburg, Ill.

Northwestern Mineral Products Co., 112 S. Church street, Rockford, Ill., has been incorporated for $50,000 to operate mining and refining plants for the production of kaolin, clay, and minerals. Incorporators: Philip H. Gleason, George R. Picken, and Robert Wehenn.

Sand and Gravel

Pine Bluff Sand and Gravel Co., Little Rock, Ark., has filed notice of an increase of capitalization from $10,000 to $25,000.

Pacoima Rock and Gravel Co., is about to make $1200 improvements to its crusher plant at 14000 Telfair street, Los Angeles, Calif.

Smoot Sand and Gravel Co., 3020 K street, N. W., Washington, D. C., has had its machine shop and stables destroyed by fire.

Hesperides Mining Co., Wallace, Calif., is reported as producing about 800 tons of sand and gravel daily. The state highway commission has contracted for the plant output.

New Brunswick, Canada.—It is reported that the program for 1924 includes an expenditure for roads of $860,000. About $250,000 will be spent annually for three years. Another $200,000 is available this year from motor receipts; a patrol fund for secondary roads amounts to $160,000, and $100,000 is available for maintenance of ordinary roads.

Quarries

M. H. Farrell Granite Co., Indianapolis, Ind., will add new equipment to its plant at 2301 South Meridian street.

Rochelle, Ill., has purchased the old Braden stone quarry in that city to make a playground and a swimming pool.

Nevada Rock Products Co., 640 San Fernando Bldg., Los Angeles, Calif., is a firm recently formed by J. M. Carson, A. K. Lindley and H. B. Westover.

Mount Pleasant, Iowa.—The stone quarry, formerly operated by the Mount Pleasant Crushed Stone Co., has been leased by a local syndicate and will be reopened, it is reported.

Monarch, Colo.—Eli Davis of Garfield is in charge of the limestone quarry here and three men have been employed. The quarries at Monarch have been closed for several years.

Hugh Murphy Construction Co., Louisville, Neb., will resume work at the quarry east of Louisville sometime this month, it is stated, which will give employment to a large number of men.

Baker Quarries, Billmyer, Penn., have begun improvements at the old Kennedy quarries, in Conoy township, which were purchased by J. E. Baker, and many more men will be employed. The siding is being put down to connect the quarries.

Napa, Calif.—About $20,000 worth of damage was recently caused by a blast in the newly established quarry of S. H. Errington, east of Napa. A barrier of huge bolders was thrown through the air by the blast for a distance of 75 yd. and tore a rock-laden bunker weighing 500 tons off its foundation, moving it about 10 ft., and dropping it on two practically new trucks, flattening them.

Clark County Quarry, near Sellersburg, Ind., is being reopened by the Inter-State Public Service Co., who has a contract to supply rock for 14 miles of pavement on State Route No. 1. This quarry has not been operated since it was taken over by the United States Government during the late war. A steam shovel has been installed and the work of setting up a new crusher and pumping out 30 ft. of water is now going on rapidly.

Indiana—It is reported that limestone this year is in great demand in construction work, according to Dr. W. N. Logan, state geologist of Indiana. The Bloomington-Bedford district, the center of the stone region, in 1923 produced 11,500,000 cu. ft. The production was 35% in excess of 1922, and it is expected that the production this year will break the record of last. According to a survey recently taken by the state conservation department, limestone producers are distributed in more than 40 of the 92 counties of the state. There are 182 large operators, in addition to a large number of small quarries from which stone is obtained for local use, such as for road material and agricultural lime.

Indiana state reformatory has no legal authority to work prisoners in a stone quarry outside the walls of the institution, according to U. S. Lesh, attorney general, in response to a query by the board of trustees of the reformatory, according to reports which further state that a stone quarry was put in operation on the tract acquired by the reformatory relocation site and it was the intention of state officials to work prisoners in the quarry. The former governor had made arrangements with the company owning the quarry for the state to buy the machinery. The arrangements made are now under investigation by Governor Branch, it being said there is no legal basis for such a contract.

Cement

Waukegan Cement Works, Waukegan, Ill., has been started by J. H. Irey of Muscatine, Iowa, for the manufacture of concrete blocks.

Sun Portland Cement Co., Portland, Ore., is now located in its new offices at 802 Wilcox Bldg., having moved from 712 Porter building.

Western Lime and Cement Co., High Cliff, Wis., suffered a $20,000 loss when a fire of unknown origin destroyed the main buildings recently.

Hermitage Portland Cement Co., Nashville, Tenn., shipped 27,300 bbl. of cement during May which was consigned to Memphis, Knoxville, and points in Alabama and Kentucky.

Krippendorf-Tuttle White Cliffs Products Co., White Cliffs, Ark., of which Martin Walsh is local manager, is planning the erection of a 2000 bbl. cement plant. Tentative contract for power has been made.

International Cement Corp., 342 Madison avenue, New York City, has work under way on additions and improvements at its mill at Bonner Springs, Kan., including the installation of additional equipment. It is expected to complete the work during the summer.

Phoenix, Ariz.—Construction of a large independent cement plant in or near here at a cost of about $1,000,000, is contemplated in the event of the development of Verde River Irrigation and Power district, according to a statement of fiscal agents representing the Portland Cement Co.

Pyramid Portland Cement Co., Des Moines, Iowa, recently reopened its plants for operation following several months of inactivity, and according to F. H. Mackanan, chairman of the board, the outlook for business is exceptionally good. About 125 men were given employment.

Cement Securities Co., Ideal Cement building, Denver, Colo., is perfecting plans for a new mill near Tulsa, Okla., estimated to cost $1,000,000 with equipment. A steam-operated electric power station will be built. Charles Boettcher is president, and Harry C. James, vice-president and treasurer.

Huron Portland Cement Co., Detroit, Mich., has started construction of a new plant at Wyandotte, Mich., which will have a daily producing capacity of 20,000 sacks, it is reported. The plant is expected to be ready for service by the end of the year. John B. Ford is president, and S. T. Crapo, secretary and treasurer.

British Columbia Cement Co. Ltd., with head offices at Victoria, B. C., has two cement plants on Soonich Inlet, 15 miles from Victoria, with a combined capacity for 1,500,000 bbl. of cement a year. The company carries on an export business. R. P. Butchart is president and managing director and Edwin Tomlin is a director and treasurer.

Brazil's Cement Imports—A clipping from the New York Times reads as follows: "Belgium continued to lead in the cement imports at Rio de Janeiro, Brazil, during March as in January and February. Imports of cement into Rio de Janeiro, stated in barrels of 150 kilos, totaled 82,820, of which 30,000 came from Belgium,

19,800 from Germany, 15,000 from Denmark, and 8,243 from Norway.

Toronto, Ont., Canada—Cement prices dropped this month, according to reports. The price is now $3.12 f. o. b. siding as compared with $3.50. There is a discount of 10 cents per bbl. for payment in 20 days, and bags are returnable at 20 cents. The retail price in Toronto is $4.50 per bbl. In Montreal the price is $3.07 per bbl., less 10 cents for payment in 20 days and 80 cents for sacks. The old price was $3.52.

Missouri Portland Cement Co., St. Louis, Mo., filed a suit for $5,000 against the Arkansas-Missouri Highway district in the federal court at Little Rock, Ark., recently, according to reports. The petition claims that the district, through its former commissioners, on April 11, 1921, issued a promissory note to W. H. Camp for work which had been done in the district by the Camp Construction Co., of Georgia. The note was transferred to the cement company.

Peerless Portland Cement Co., First National Bank building, Detroit, Mich., is asking bids on a general contract for a one-story machine shop, 49x182 ft., at its new mill in the River Rouge section, estimated to cost $45,000 with equipment. Albert Kahn, Marquette building, is architect. Construction is in progress on initial buildings at the new works. The company is disposing of a stock issue of $3,667,000, a portion of the proceeds to be used for the new plant. William H. Hatch is president.

Concrete Products

Watauga Cement Products Co., Bristol, Va., has increased its capital stock from $20,000 to $50,000.

S. B. Shepard, 3026 East First street, Duluth, Minn., is about to begin erection of a concrete block factory at 4031 Lombard street.

Sarasota, Fla.—A Duntile plant is to be installed at the new townsite of Richardson, seven miles east of here by L. L. Richardson, who is developing the townsite.

Portland Cement Stone Co., Topeka, Kan., has recently put in additional machinery and states that it is now making a better concrete block than it has ever made.

R. E. M. Cement Products Co., 461 High street, Mt. Holly, N. J., recently incorporated to manufacture concrete products, has for its officers: A. J. Mullen, president; N. P. Edmonds, vice-president; W. S. Rendell, treasurer; and Geo. F. Rendell, secretary and manager.

Anamosa Cement Products Co., Anamosa, Iowa, whose factory is at Hurstville, began operations recently at one of its branches, and a force of eight men are busy putting out cement blocks for the trade.

Western American Concrete Co., 1147 Glendale boulevard, Los Angeles, Calif., has purchased a site on San Fernando road, near Riverside Drive, Glendale, Calif., and will manufacture the Woodlock concrete block.

Stuart, Fla.—R. L. Ensley, Stuart, Fla., W. S. Ohmit, Columbus, Ohio, R. L. Bobb, Philadelphia, Penn., and others, are organizing a company to establish a plant here for the manufacture of concrete brick by the Duntile process.

Acme Concrete Products and Gravel Co., Adrian, Mich., of which A. C. Deer, vice-president of the Peninsular Portland Cement Co., Cement City, Mich., is president, has work in progress on a new local plant for the manufacture of concrete cast and pressed products, including tile, blocks, brick, etc. It is expected to have the plant ready for service at an early date.

J. S. Schirm Commercial Co., San Diego, Calif., for many years in the building material line, has obtained the exclusive rights for making mixed mortar under the Blue Diamond patent and is erecting a plant to cost $30,000. The name adopted for its mortar is "Spred-Ezy," denoting the easy working qualities. In addition to the new product the company will handle its same lines of Victor cement, Grand Canyon lime, Beaver Board and Pioneer roofing. The plant will be a permanent addition to the industrial development of San Diego.

Indiana—It is reported that after several preliminary skirmishes, the concrete interests of Indiana won its battle with the asphalt interests in the matter of materials for paving Indianapolis streets. The board of public works has decided not to eliminate concrete from the specifications for street paving as was recommended by Frank C. Lingenfelter, newly appointed civil engineer. Mr. Lingenfelter had submitted specifications for several paving projects providing for a choice between asphalt and a number of other kinds of paving. In the past it has been the custom of the board to call for bids on materials, including concrete. Concrete was left out of the last specifications. Two members of the board favored keeping it in and one approved the engineer's action.

Lime

Bluff City Lime Co., St. Genevieve, Mo., has preliminary plans under advisement for the installation of a new plant on local site for the production of hydrated lime. E. Olsen is general manager.

Colton Cement Plant, Colton, Calif., suffered a $1000 loss at its Mill A lime plant recently when a box car partially loaded with lime was burned. The blaze is thought to have been caused by spontaneous combustion.

Cascade, Iowa.—Joseph Menster opened up his big crushed limestone plant recently and an entirely new outfit has been installed for this purpose. Farmers from different sections of the country are busy hauling the product to their farms. The crushed stone is used to sweeten sour soil and improve wornout soil. It is especially adapted for making a seed bed for alfalfa and clover.

Slag

Birmingham Slag Co., Birmingham, Ala., produced over 58,000 tons of crushed and screened basic slag at the Ensley plant during May. The company also made 1,012,000 Slagtex brick during the month.

Agstone

Indiana—It is reported that an order reducing freight rates on agricultural limestone used to neutralize and fertilize tilled soil is requested in a petition filed by the Indiana State Chamber of Commerce with the public service commission. The petition asserts agricultural limestone can be shipped from Illinois and Ohio points cheaper than it can be shipped from quarries in Bedford, Greencastle, Spencer, Huntington and Logansport. Because of the alleged discrimination, the petitioner says the price on the agricultural limestone is such that its use is not as general as it would be if the price were lower.

Gypsum

Gypsum Products Co., Phoenix, Ariz., recently organized, will begin the construction of a new plant at 16th street and line of the Arizona Eastern Railway Co., consisting of a number of 1-story buildings, for which a contract has been let to the Mine and Smelter Equipment Co., 230 East Adams street. Gilmore Goodland heads the new organization.

Rock Asphalt

Cherokee Rock Asphalt Co., Cherokee, near Sheffield, Ala., is perfecting plans for the erection of a refining plant at its local sandstone rock asphalt deposits, estimated to cost in excess of $250,000, including equipment. Dr. Miller Reese Hutchison, 233 Broadway, New York City, is said to be actively interested in the project.

Feldspar

United States Feldspar Co., Gloversville, N. Y., headed by C. H. Peddrick, Jr., 170 Broadway, New York City, has plans under way for a one-story grinding and sorting mill, estimated to cost $150,000 with machinery. It is expected to begin work during the summer.

Manufacturers

Industrial Works, Bay City, Mich., announce the appointment of Ridenour, Seaver & Kendig, 773 Ellicott Square, Buffalo, N. Y., L. N. Ridenour, resident manager, as their representatives in the Buffalo district.

Schaffer Engineering and Equipment Co., of Pittsburgh, Penn., will be known as the Schaffer Poidometer Co. after July 18. This change is due to the fact that they have discontinued their engineering department and are now confining their efforts chiefly to the manufacture of the poidometer and its appurtenances. The main offices of the company will be located at the old address, 2828 Smallman street, Pittsburgh, Penn.

Chain Belt Co., Milwaukee, Wis., manufacturer of "Rex" power transmission chains, conveyors, traveling water screens, and concrete mixers, at its annual meeting this month, elected the following officers: J. C. Merwin, works manager, was elected second vice-president. Mr. Merwin is a graduate of Sheffield Scientific School, Yale University (1910), and has been associated with the company since 1917. Brinton Welser, secretary, and C. E. Stone, assistant secretary. Mr. Welser is a graduate of the University of Wisconsin (1912), and has been with the company in various capacities ever since. Mr. Stone is assistant to the president, and has also been purchasing agent since 1918. He is a graduate of the University of Michigan (1910). The officers reelected were: C. R. Messinger, president; Clifford F. Messinger, first vice-president, and C. L. Pfeifer, treasurer.

Trade Literature

S. Flory Manufacturing Co., Bangor, Penn. Catalog 37 on slate-working machinery for quarrying, sawing, planing, grooving, and rubbing of slate.

Denver Rock Drill Manufacturing Co., Denver, Colo. Catalog entitled Waugh Turbro Drifters, describing and illustrating Models 31 and 34 drills of this company's manufacture. The Model 34 is used for heavy work such as drilling deep holes in quarries for primary blasting, etc.

Louis-Allis Co., Milwaukee, Wis. Bulletin 408 on the ball-bearing motor made by this company, and Bulletin 406 illustrating and describing the polyphase, squirrel-cage, heavy-duty motor; the various parts are shown and described in detail.

Morris Machine Works, Baldwinsville, N. Y. Bulletin 122 describing Morris double-suction centrifugal pumps with horizontally split casing. The construction and operating details of these pumps are fully explained and curves are given showing performance and other characteristics of different sizes under various conditions of operation. Several installation and operating hints for centrifugal pumps are also given.

Mid West Air Filters, Inc., 100 East 45th street, New York City. New data book on air filters for compressors and internal combustion engines. This booklet is well illustrated and contains a number of tables of capacities and sizes, constants for finding uniform air flow, friction loss tables, and tables giving pressure corresponding to various velocities. Three charts on how to determine the proper size of filter with instructions for using are included.

Sullivan Machinery Co., 122 S. Michigan avenue, Chicago, Ill. Bulletin 71-H on air lift pumping equipment, which is a handbook of 48 pages on this subject. Several typical installations are discussed and the results secured in each are shown. A variety of installations is also illustrated, showing municipal, industrial, irrigation and railroad air lift plants, both at home and overseas. The use of air lift boosters or re-lift apparatus is also discussed, and instructions for securing well data are given, together with a number of useful engineering tables.

Personals

Francis A. Monk of Roddy & Monk, quarry operators, Kingston, Ont., Canada, recently received fatal injuries when accidentally struck by a boom at the corner of Montreal and Russell streets.

Chris E. Stiver, for the last three years local representative of the C. E. Smith Engineering Co., St. Louis, Mo., has resigned from that concern to become a salesman for the Marquette Cement Co. in the Southeast Missouri territory where he is well known.

H. E. Nichols, formerly assistant superintendent of the Southwestern Portland Cement Co., El Paso, Tex., has been promoted to the position of superintendent to take the place of O. J. Binford, pioneer El Pasoan, who resigned to take a similar position with a cement company at Dayton, Ohio. Announcement of the promotion of Mr. Nichols was made coincident with those of R. R. Cochland to the position of chief chemist and of William McKenzie to assistant chemist, left vacant by the promotion of Mr. Cochland.